News about

B.F.Goodrich Chemical *raw materials*

HYCAR 4021

operates from 100° to 150° higher than most other rubbers

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You can get complete information on the advantages and compounding of Hycar 4021 in Bulletin HM-3. For a copy, or for information about any of the many Hycar rubbers and latices, write Department FA-6, B.F.Goodrich Chemical Company, 3135 Euclid Avenue, Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

See our catalog in Sweet's Product Design File.

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Rubber Age

COVERING THE MANUFACTURE OF RUBBER AND RUBBERLIKE PLASTICS PRODUCTS

JUNE, 1960 VOL. 87, NO. 3

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Highlights Sidelights *of the News . . .*

June, 1960

The 77th meeting of the Division of Rubber Chemistry, A.C.S., held at the Statler-Hilton Hotel in Buffalo N. Y., May 4-6, attracted some 1,100 persons who gathered to hear 16 regular technical papers, two invited papers, and the Charles Goodyear Medal Lecture (page 493).

United Carbon Co. has opened its new service laboratory in Akron, Ohio . . . The modern, two-story facility is equipped with instrumented mixing equipment and the latest commercial processing equipment and a broad range of physical and analytical testing devices . . . See the complete picture story (page 496).

The American Institute of Electrical Engineers held its 12th Annual Technical Conference on Rubber and Plastics on April 25 and 26 at the Sheraton Hotel in Akron, Ohio . . . A total of eight papers were presented at sessions on automation of tire handling systems; computers; instrumentation, and rotating machinery (page 498).

A plant designed to produce 40 million pounds of polypropylene a year was put on stream on May 10 at the Baytown, Texas refinery of Humble Oil . . . The output will be marketed by Enjay under the trade name of "Escon" (page 500).

Union Carbide Chemicals Co. has opened its new technical service laboratory in Tarrytown, N. Y. . . . The laboratory will provide complete test data and service back-up to company customers (page 501).

A proxy fight for Industrial Rayon Corp. was in the news following the cancellation of a proposed merger with the Texas Butadiene & Chemical Corp. . . . Meanwhile, Industrial Rayon has announced several major management shifts (page 503).

A program for the construction of a $50 million complex of chemical plants which would convert hydrocarbons into more than a dozen chemical products has been jointly announced by U.S. Rubber and Borden . . . The jointly-owned chemical company will be called Monochem, Inc. (page 507).

The recently closed plant of Gutta Percha and Rubber, Ltd., Toronto, Ont., has been sold for about $750,000 . . . Gutta Percha's closing was attributed to foreign competition and the company's inability to compete with Canadian subsidiaries of foreign companies (page 514).

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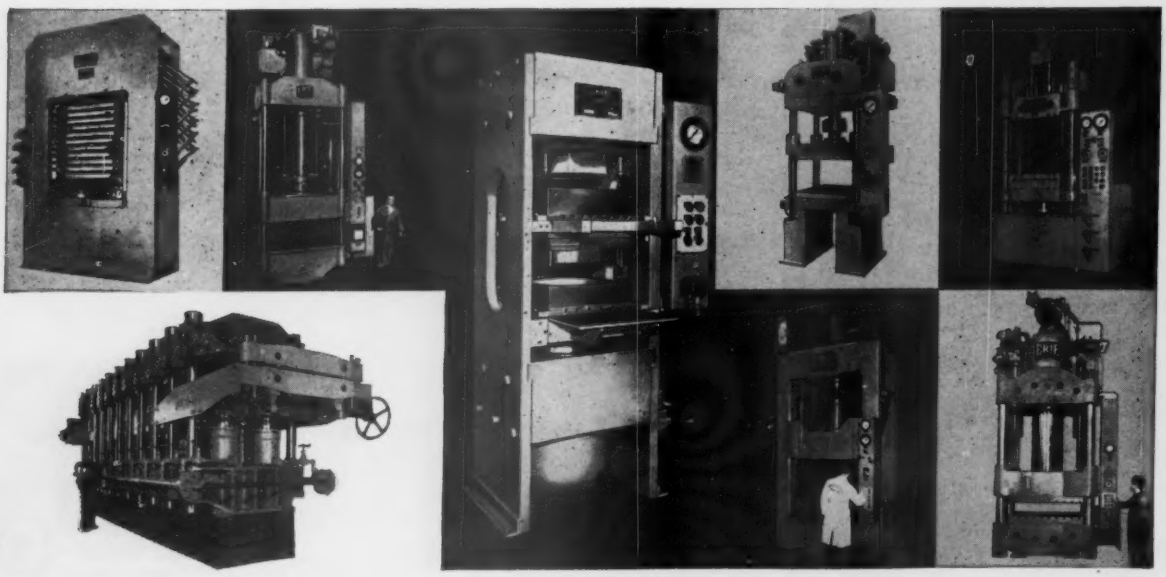


GOODYEAR

where do we stand today?

(A brief, illustrated report on the current products and services of our Rubber & Rubber Chemicals Department—their use and acceptance throughout the rubber industry.)

GOODYEAR
CHEMICAL DIVISION

SURE WAY TO KEEP A STEP AHEAD in the shoe sole business is by using PLIOFLEX. Its light color, assured ease of processing, high uniformity and excellent physical properties permit top quality at low cost.

HARNESSING THE HORSEPOWER of aircraft engines often is the job of tiny "O"-rings of CHEMIGUM, with its excellent resistance to heat, cold and hydraulic fluids, good physical properties and easy processing.

Progress Report on Chemigum,

RIGHT DOWN THE ALLEY are bowling balls with outer shells of PLIOFLEX. It provides greater toughness, a better finish, and extreme uniformity at lower cost because of its uniformity and assured processability.

ANSWER TO A BARREL OF PROBLEMS was the use of CHEMIGUM in hard-rubber electroplating cylinders. Reasons: High strength plus resistance to high temperatures, chemicals and solvents that added up to a useful life three times longer than the material previously used.

Few, if any, companies can match the experience of Goodyear in the manufacture of synthetic rubber and related products.

As early as the 1920's, our researchers obtained patents from which today's manufacture of synthetic rubber has been derived. In 1939, CHEMIGUM became the first nitrile rubber to be commercially produced in this country. And this type of leadership has continued down through the years.

Where do we stand today? Here are a few highlights on the products of our Rubber & Rubber Chemicals Department:

1. PLIOFLEX—our styrene/butadiene or general-purpose rubbers—the most widely used synthetic rubbers in the world today and the only ones that provide Assured Processability.

2. CHEMIGUM—our oil-resistant rubbers—still first and finest of the nitrile rubbers—choice of many quality manufacturers for exacting jobs.

3. PLIOLITE S-6—our high styrene, rubber reinforcing resins—

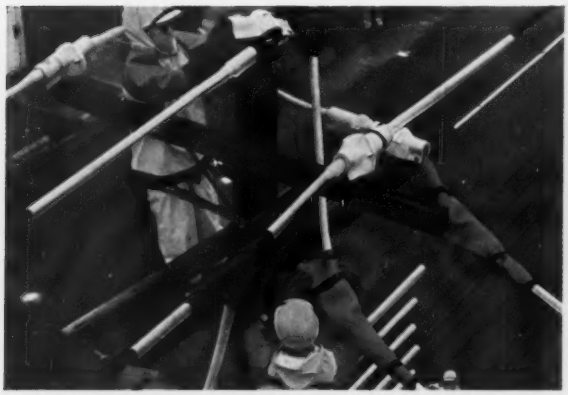
Lots of good things come from

GOOD

RUBBER THAT KEEPS ITS AGE A SECRET . . . happy result of the development of WING-STAY 100—first truly effective combination of antioxidant and antiozonant and now available in PLIOFLEX "C" rubbers.

INFLATABLE PRODUCTS AT DEFLATED PRICES but of excellent quality are made with covers of PLIOLITE S-6B and PLIOFLEX. Light color, leather-like properties with excellent resistance to abrasion and moisture are the reasons for their use.

Plioflex *(and related products)*



"FOUL" WEATHER FRIENDS are the linemen's suits pictured above. They're made invitingly warm and comfortable with a coating based on PLIOFLEX and carefully protected with WING-STAY T for long-term softness, flexibility and light color.

BUILT TO TAKE A BEATING is the handsome car floor cover you're looking at here. It's made of PLIOFLEX to assure clean, crisp colors and excellent durability at low cost. Its high uniformity and easy processing help make this possible.

have no peer in processability or in the way they impart leather-like properties to all kinds of rubber.

4. WING-STAY T—our nonstaining antioxidant—is the outstanding protector of light-colored rubber products against age, sunlight and discoloration.

5. WING-STAY 100—our staining antioxidant—is unmatched in its trend-setting, triple-threat performance as a stabilizer, antioxidant and antiozonant in transportation rubber products.

What's the reason for this progress? It's the man in all these man-made products. Our research, development and production people, our sales-service men and our sales representatives have outdone themselves to create and supply the finest available line of raw materials for the rubber industry. Testifying to their achievement are the products shown here which come from a few of the hundreds of reputable manufacturers we are proud to list as our customers.

If you would like further information on any of the products of our Rubber & Rubber Chemicals Department, feel free to write to Goodyear, Chemical Division, Dept. R-9419, Akron 16, Ohio.

GOODYEAR CHEMICAL DIVISION

Chemigum, Plioflex, Pliolite, Wing-Stay—T. M.'s The Goodyear Tire & Rubber Company, Akron, Ohio

GOODYEAR

where do we go from here?

No one can predict the future exactly. But one thing is certain—the market for synthetic rubber will continue to grow—and rapidly. Current estimates are for present consumption to double in the next ten years.

From our standpoint, this sort of growth will bring with it the development of many new and improved rubbers. It also will bring even higher standards of product quality and service. And it's our firm intention to keep pace with this growth and development – to maintain, or improve where possible, our current position in the field.

Toward this end, our extensive research and development facilities are continually at work on new and different polymers and compounding chemicals as well as on the improvement of current products. Similarly, our production plants are continually being modernized and expanded to keep pace with developments and demand. We think you will agree that the results of this type of program are evident in the extent and quality of our current line of products.

In still another area, our technically trained sales force and well-equipped sales-service laboratories are so organized as to render the ultimate in service and to expand as required by the market growth. Here again, we invite your appraisal.

Speaking of appraisal, may we suggest, if you are not already acquainted with our products and services, that you sample both by contacting the nearest sales office listed below:

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6666 East Washington Boulevard
Phone: Raymond 3-3611

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180 Goodwin Street
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Phone: Michigan 2-8800

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66 "B" Street
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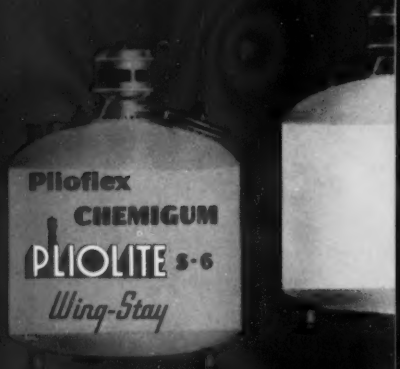
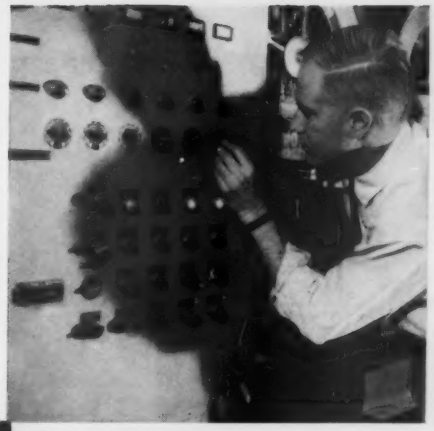


Lots of good things come from

GOODYEAR

CHEMICAL DIVISION

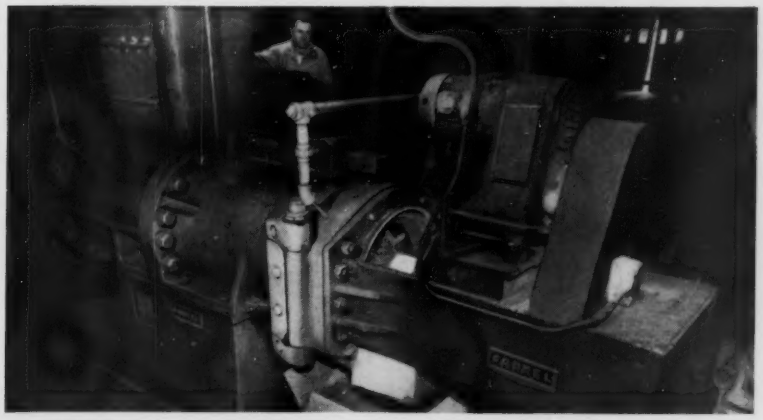


Control panel for automatic weighing of masterbatch materials.

For tire plant...

New Banbury mixing system raises capacity one third . . . cuts defect rate to 0.4%

Operator placing raw rubber on conveyor to Banbury hopper. Later, other ingredients, which have been automatically measured, will be added.



Farrel 15" pelletizer, installed directly under Banbury, produces pellets 5/8" in diameter and discharges them through a slurry onto a vibrating drier. The pellets are then elevated by conveyor in a continuous stream to a penthouse storage assembly, where they are delivered as required to the finish-mix Banbury.

In daily mixing of masterbatches for tire production, Lee Rubber and Tire Corp. employs a system recently developed by Farrel-Birmingham. Designed around a size 11D Banbury® mixer operating at 60 RPM, the setup has increased production capacity one-third.

And, according to Patrick Boyle, assistant director of research and development, "Since we began using this new Banbury mixing system, we've kept charts based on a data list from 4500 batches. Out of that number only 18 batches have been 'out of spec.' That amounts to only fourtenths of one per cent, which is a considerable reduction from our previous defect rate."

Operation of the system is almost completely automated with material handling, weighing, charging and mixing being controlled through preset variable resistors. Four different blacks are handled in any combination, and six different oils. The Banbury discharges directly into a 15" pelletizer, which transforms the batch into easily weighed pellets. These are conveyed as required to the finish-mix Banbury.

Why not discuss your requirements for an automated mixing system with a Farrel engineer? He will be glad to call at your convenience.

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KETJEN CARBON

A NEW INDUSTRY IN THE NETHERLANDS

The most recent inventions and experiences of Godfrey L. Cabot Inc., who supplied the know-how, and the Royal Sulphuric Acid Works Ketjen Ltd. have resulted in many new features in carbon black plant construction. Revolutionary for this industry is the abundant use of stainless steel whereby an end-product is obtained with extremely low grit content. The two units are equipped with ready to start spare engines and the power and steam required are generated in the plant, assuring continuous and uninterrupted operation so essential for uniform quality.

FROM THE COUNTRY OF THE BLACK KETJEN CARBON NOW SERVES THE RUBBER INDUSTRY.

KC-4-62

With this plant Ketjen Carbon Ltd. became a pioneer in an entirely new industry for the Netherlands. After a successful start-up on April 24, 1960, this 24.000 t/yr plant is now in production of

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KETJENBLACK-SRF

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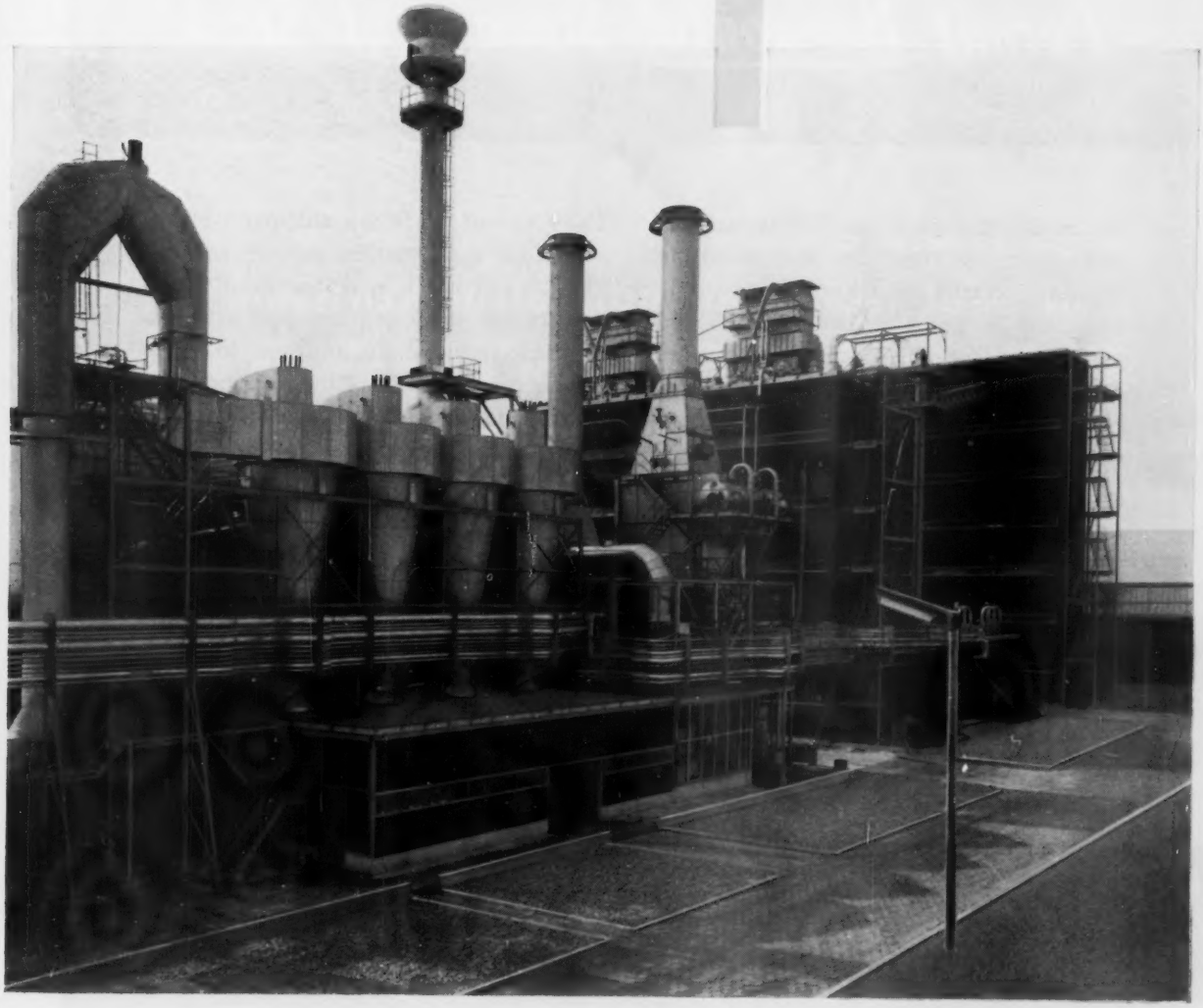

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They speed work by stopping stock adhesions and insuring easy separation. The life of your liner is increased, tackiness of the stock is preserved and loss of stock reduced. In addition to these production benefits, Climco Processed Liners protect the stock itself in many important ways.

Since 1922 Climco Processed Liners have proved their worth to the rubber industry. Give them a trial in your plant.

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For your next SBR wire insulation compound that must really take it, specify Marbon 8000 AE resin.

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Photographed with the cooperation of Mohawk Carpet Mills, Amsterdam, N. Y.

No slip showing

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Because of its ease of dispersion and high-hiding, TITANOX-RA-50, the multi-purpose rutile titanium dioxide pigment, is a favorite with many of America's manufacturers. However, when clean whiteness is considered more important than maximum opacity and minimum pigment content, TITANOX-A anatase titanium dioxide pigment may be preferred in certain latex applications.

As it is with latex, so it is with other rubber products and plastics . . . TITANOX titanium dioxide pigments meet every requirement of performance and production. Our Technical Service Department will be happy to work with you in adapting these outstanding white pigments to your particular needs. Titanium Pigment Corporation, 111 Broadway, New York 6, N. Y.; offices and warehouses in principal cities. In Canada: Canadian Titanium Pigments, Ltd., Montreal.

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TITANOX

7647B

As Ken Soule Sees It

by Kenneth J. Soule

Launching Pads

A comparatively few years ago, guided missiles and the platforms from which they are launched into space were entirely unknown. However, in other fields of controlled trajectory, the equivalent of the missile launching pad was in common use.

For instance, in certain athletic events it has always been standard practice to provide contestants with designated areas from which they were to start their competitive efforts. As an example, take high jumping, where the substitute for the launching pad was, and is, called the take-off. In the "good old days"—say about a half century ago—these take-offs were, naturally, out of doors, and consisted of a smooth well-raked and well-rolled patch of *terra firma*.

From this point the hopeful athlete would hurl himself into space, trying his muscular best, by squirming, kicking and wriggling, to clear the bamboo pole suspended from pegs on the two side standards. If he succeeded, and the pole remained in place, the act was repeated at a new height until the contestant's limit was reached. Memory, which admittedly can be treacherous about events so long ago, says that the best long-legged high school leapers of that period occasionally managed to clear 5 feet, 8 inches. Perhaps we didn't actually do quite that well, but one thing is undeniably true; even the world's best high jumpers of the 1910 era only set records of around six feet, three inches.

At that time, the common form employed by most high jumpers was the "scissors," in which the leap, kick, and follow through attempted to propel the body over the crossbar in a prone position, with the jumper's back next to the bar. This obviously was doing it the hard way, since the backside inevitably stuck out too far and did more than its share of pole-knocking-off. Although first attempts to change to a rolling style, in which the body slid over the cross stick face down, met with claims of unfair competition, the new method gradually relegated the old one to the scrap heap. As time went on, improvements took place in the take-off areas as well, with cinders and clay providing a stable, reliable footing, and with improved footwear also contributing its bit. The combined result was a steady inching upwards of the world's high jump record until we have now reached a dizzy height of 7 feet, 1½ inches.

This latest figure was realized by the great Boston University sophomore star, John Thomas, jumping from an asphalt cellulose take-off. He has also cleared over 7 feet from clay, and from rubberized-asphalt areas, so it seems fair to discount the underfoot angle, and give full credit to the skill and determination of this 19-year-old athlete. No matter what type of launching pad is offered for his take-off he gives a thrilling account of himself—deserving the term coined by a *Herald Tribune* sports writer for the present crop of top-notch U.S. track stars—a real "guided muscle."

Ahoy, Mr. Chips

In order to avoid any misunderstanding, and to prevent the charge of securing anyone's attention under false pretenses, may we say at the onset that the beloved schoolmaster of James Hilton's best seller is *not* involved in the following dissertation.

The common noun "chip" embraces a wide variety of meanings. To most people, it probably denotes a small piece, bit or fragment of stone, chinaware, wood, or what have you. However, when you come to hybrid chips, the spread widens rapidly. To the card player, a poker chip represents a most important commodity, although of course, potato chips are not to be sneezed at either, to go with your favorite beverage. And to us old timers who braved the perils of the far West in covered wagons, buffalo chips often came in mighty handy, pardner, as fuel on a frosty morning.

We could go on and on, but someone might say "just a chip off the old block," so let's get down to the main subject: real, honest-to-goodness Wood Chips, made to order.

As outlined in a newsy article in *Ind. and Eng. Chemistry* (Vol. 52, No. 2), such wood chips are an important part of the material and money-saving dream of the Crown Zellerbach Canada Co. It seems that the basic problem involved is the fact that many sawmills in the Pacific Northwest and in adjacent Canada are located far inland—many miles away from the seacoast pulp mills—and therefore cannot afford to ship their normal scrap wood, edgings, etc., to these logical users. As a result, each sawmill burns vast amounts of this valuable scrap wood every year, merely to get rid of it.

The CZC brain wave is simply to take all this "waste wood," convert it into chip form and float it downstream from the sawmills to the paper mills in huge spherical containers. The first of such spheroids has been constructed by Pacific Plasti-Glass Developments of New Westminister, B.C. It is eight feet in diameter —with walls ⅛th of an inch thick—made of fiber glass reinforced "plastic." The fabricated quarter-spheres are joined to make hemispheres, which, when bolted together, form the complete ball. Filling and unloading takes place through a built-in circular port.

The maiden voyage of CZC's dream sphere, with a pay load of two tons of prepared sawmill chips, consisted of a 50-mile journey down the tempestuous Fraser River in British Columbia. The route is described as rugged and rocky, but the big globe came through unscathed; and, equally important, the wood cargo remained dry. During a second run the ball got sidetracked on a sandbar.

Crown Zellerbach is quite happy about the results achieved so far and plans to continue the tests, possibly also including spheroids made of rubber and other plastics. Naturally, many problems remain to be solved, including that of keeping track of all the bobbing balls to be certain they neither get stranded en route, nor go past their destination and join the Pacific Ocean

As Ken Soule Sees It (Cont'd)

fleet. At any rate, CZC deserves three cheers for original thinking, and for the dogged determination that they would *not "let the chips fall where they will."*

Year Round Anti-Freezes

Ordinarily, at this time of year no subject is more completely out of the news in continental United States than automotive antifreeze solutions. Incidentally, the same thing is probaby true in all temperature zones throughout the world. However, the situation promises to be uniquely different this year, and bathing suits and Bikinis may have to share part of the advertising spotlight with two new and novel antifreezes.

The two products in question are Dow Chemical's Dowgard, and Du Pont's Telar. Both have undergone extensive company testing, and are being introduced for the first time this spring and summer to what is hoped will be a receptive public. The most spectacular feature of each is the claim that the solutions do not need to be drained after the winter season, but in fact are meant to be left in the automotive cooling system through the entire year, to provide both anti-freeze and anti-corrosion protection.

Dowgard and Telar are both based on ethylene glycol, plus specific inhibitors to protect against corrosion. They will be marketed only through service stations.

Dowgard is furnished as a complete solution, ready for use. Besides the glycol and inhibitor, the solution contains specially purified (de-ionized) water. The cost for most cars will be between $8 and $12, depending on the size of the cooling system. It provides protection against freezing to —40°F. Dow recommends changing the coolant once a year to insure complete corrosion protection.

Composition of Systems

Du Pont, on the other hand, claims that its product, Telar, can be used continuously, and never needs to be drained, except in the few cases where leaks in the hose, gaskets, or other parts of the cooling system cause damaging contamination. When this happens, the solution changes color from red to yellow, indicating the need for remedial action. Telar sells for $5 per gallon, which is said to be enough to protect the average car to 0°F.

This is it—nothing to do now but put the entire matter out of your mind and let your sub-conscious take over. Then, when icy breezes begin to blow, your Mr. Id will be ready to tell you what to do about the car radiator situation. And in the meantime, if any of your favorite TV, radio, or magazine listenings or lookings get overrun with Dowgard or Telar commercials, at least you'll know what they are talking about, weather or not.

Floating Gold

Attention, beachcombers! While you are busily engaged in patrolling your favorite stretch of seashore sand this summer, you may unknowingly be passing up a small fortune lying at your feet.

The source of this potential windfall is a fascinating material called ambergris which, oddly enough, is manufactured in the intestines of sperm whales and occasionally excreted by them into the ocean. In spite of this slightly sordid origin, ambergris is widely used in a purified state as a fixative for perfumes (especially the more expensive ones), and commands a price ranging from $2 to $10 an ounce, depending on the quality and current availability. An interesting article by Arthur C. Clarke in the Feb. 1960 *Holiday*, and a bulletin put out by the Marine Laboratory, University of Miami (Fla.), describe the material, present background information regarding it, and also outline methods of testing to determine whether or not your piece of beach boodle is real or merely junk. Perhaps a short summary and a few direct quotes will best serve to present the salient facts.

The physical properties depend upon the age of the sample, as well as length of exposure to sun and air. *Color:* varies widely from off-white, through brown to almost black. May also be mottled and is quite likely to contain broken-up bits of the horny beaks of giant squids, which are the whale's chief source of food. *Consistency:* usually like wax or pitch, but may be hard and brittle. *Specific gravity:* from 0.78 to 0.98. *Melting point:* 145-150°F.

Crucial Ambergris Test

The crucial test, which will enable you to determine whether or not a sample is true ambergris, is as follows: "Heat a needle or wire for about 15 seconds in a flame (of candle, gas, or cigarette lighter) and press into the piece in question. If it is genuine ambergris, a dark brown resinous liquid will form around the wire and appear to boil. Then touch the warm, molten material with your finger; true ambergris will leave tacky, pitch-like strings adhering to your skin. When cold, these resemble shiny black enamel. Heat the wire again, with some of the melted material on it, in the flame. Real ambergris emits white fumes, then burns with a luminous flame and when the flame is extinguished the smoke smells like burning rubber!"

So there you are, with some ground rules for one treasure hunt where you can't possibly lose. You have an outside chance (maybe 10,000 to 1) of hitting "pay dirt," but even if you don't succeed in the endeavor, you will be getting educated anew as to what long time exposure to salt water, air, and sun will do to hunks of wood, leather, tallow, wax, rubber goods, or what have you. And at the same time you will be enjoying yourself, breathing in oodles of ozone and acquiring a beautiful sun tan in the process. Happy Days and Good Hunting!

Suburbia

Noted on the smooth, grassy slope of one of the neatly manicured yards in Our Town—two small wooden signs, white painted letters on a green background, reading as follows: "I Vant To Be a Lawn" and "Your Feet Are Killing Me."

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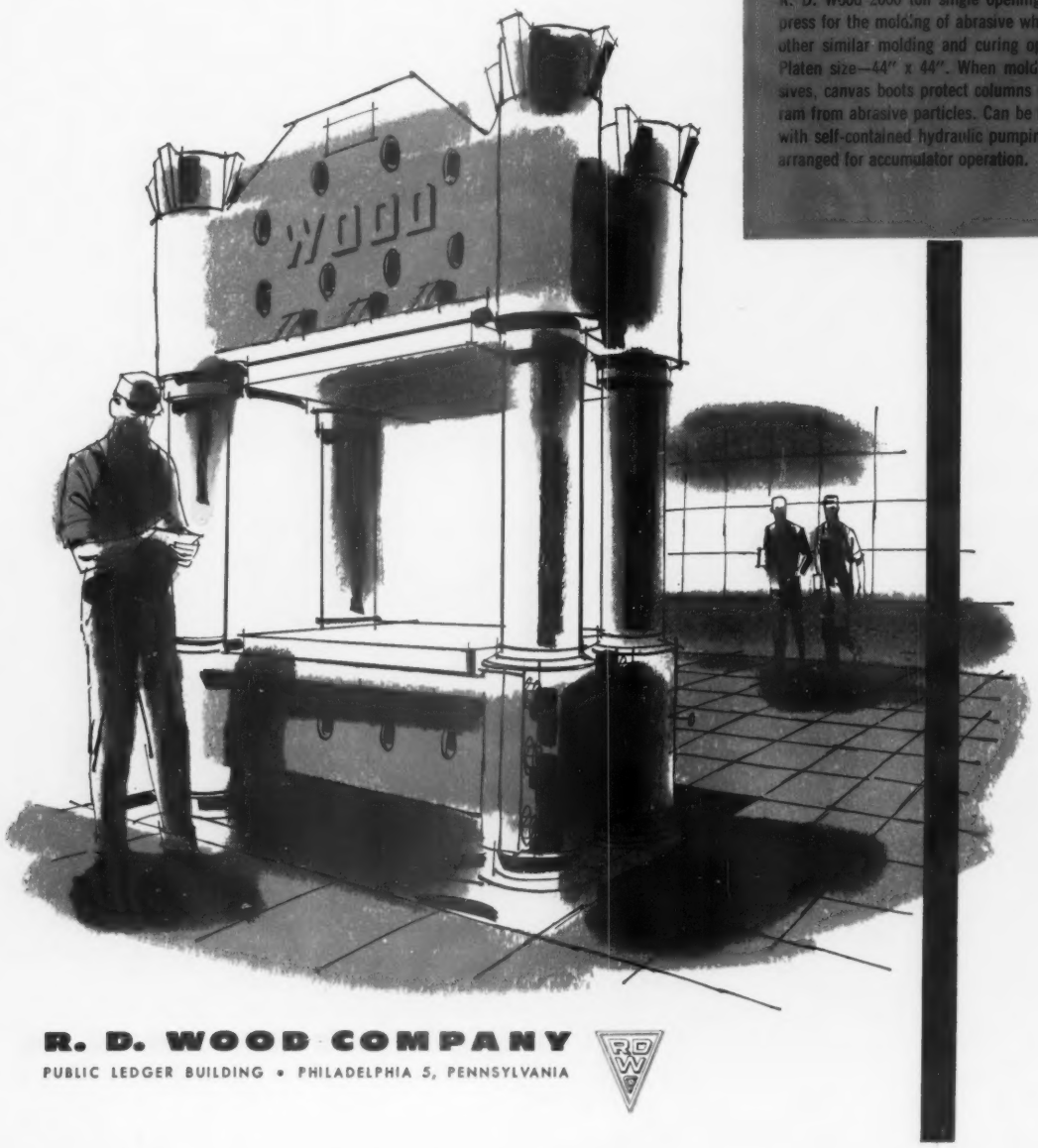
R. D. Wood 2000 ton single opening molding press for the molding of abrasive wheels, and other similar molding and curing operations. Platen size—44" x 44". When molding abrasives, canvas boots protect columns and main ram from abrasive particles. Can be furnished with self-contained hydraulic pumping unit or arranged for accumulator operation.



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Ratio of natural rubber to SBR	Tensile Strength— 125 Part Loading		Tensile Strength— 150 Part Loading	
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50-50	2,400 psi	2,030 psi	2,110 psi	1,890 psi
25-75	2,440 psi	2,200 psi	2,120 psi	2,020 psi
0-100	2,140 psi	2,000 psi	2,000 psi	1,790 psi

Tear strength is high

Ratio of natural rubber to SBR	Tear Strength — 125 Part Loading		Tear Strength — 150 Part Loading	
	Super Multifex	Multifex-MM	Super Multifex	Multifex-MM
50-50	270 pit	240 pit	300 pit	225 pit
25-75	225 pit	200 pit	240 pit	200 pit
0-100	200 pit	175 pit	220 pit	200 pit

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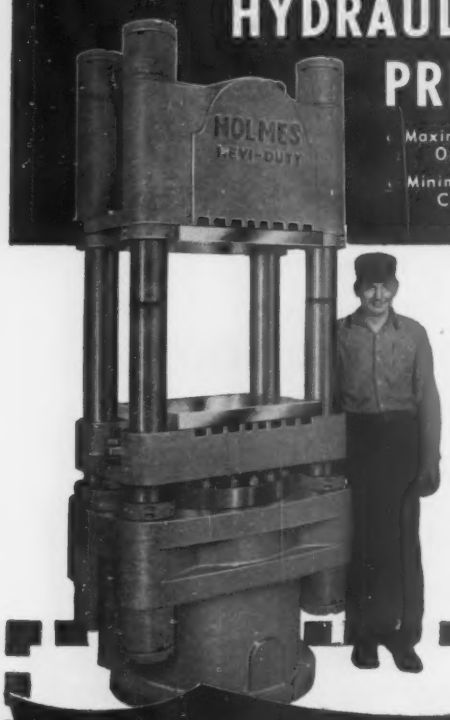

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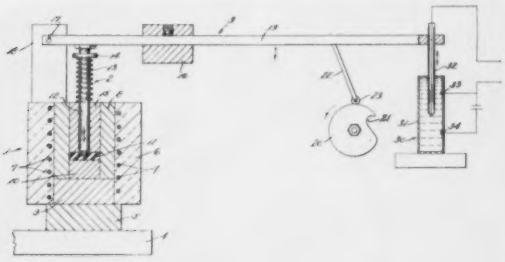
PATENT REVIEW

by Melvin Nord

Device for Rubber Testing

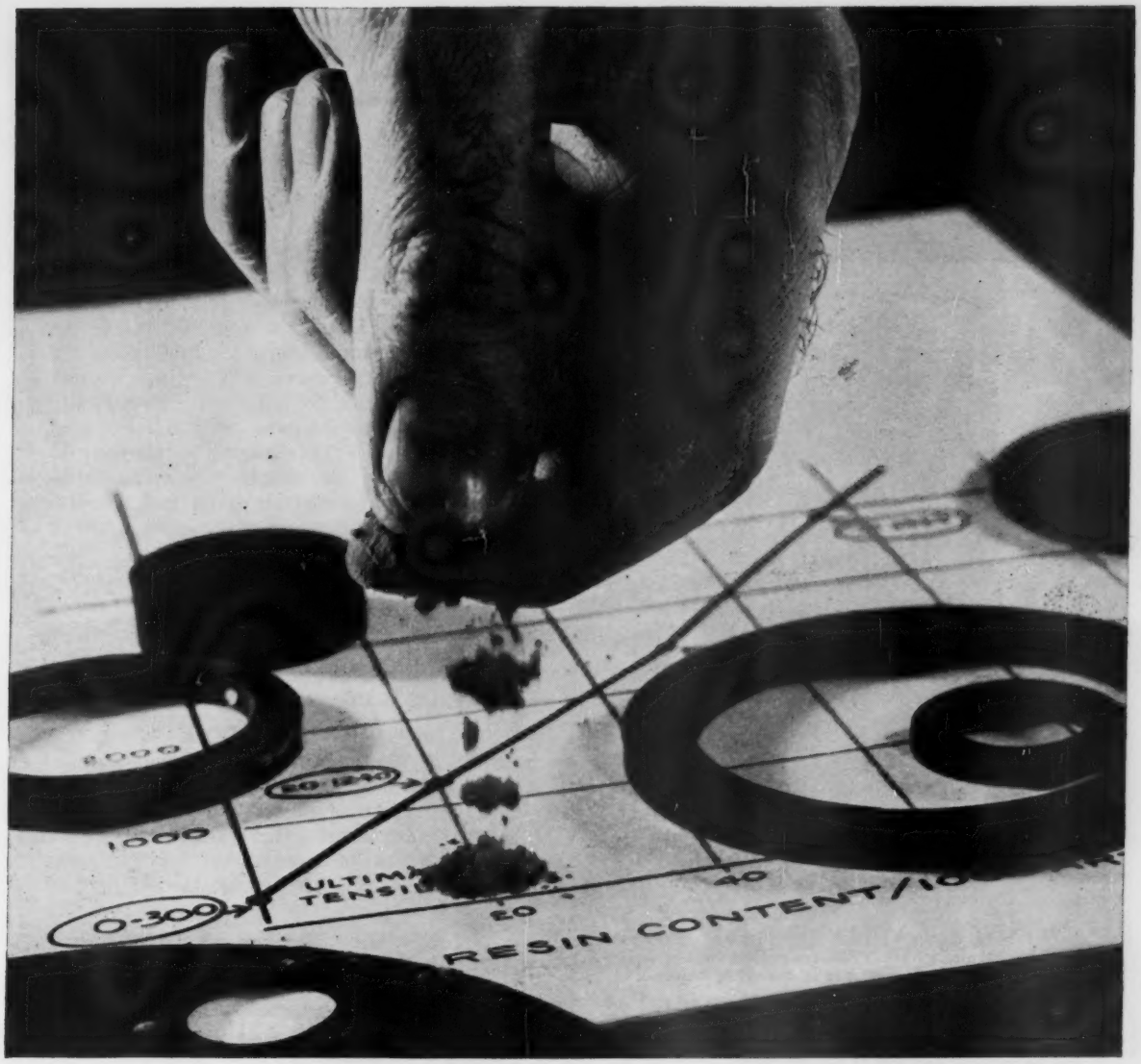
U. S. Patent 2,904,994, issued Sept. 22, 1959, to William E. Claxton and assigned to Firestone Tire & Rubber Co., describes a device for sensing physical property changes in rubber materials subjected to heat, during the treatment of the material.

As shown in the diagram, a sample of rubbery material (11) is placed on a support (10), and on top of it a cylinder (15) within another cylinder (8). Plunger (12) is centered in cylinder (15) with one end of its spring (13) bearing on the top surface of the cylinder and the other end abutting against stop (14). The sample is preheated by the coils (7) of an electric oven. Next a motor rotates cam (20) in a counter-clockwise direction, so that the follower (23) follows the peripheral surface of the cam under the urging of loading arm (19) until it comes to recess (21). The follower drops into this recess.



The first sudden drop of the loading arm and weight (16) thrusts plunger (12) down into sample (11) forming a pocket which encloses the end of the plunger. This end remains in the sample as arm (19) is raised, while follower (23) follows the surface of cam (20). The distance of travel of plunger (12) in response to arm (19) is proportional to the plasticity of the sample clinging about its end. In the early stages of the heating process, when the sample is soft and only partially vulcanized, the plunger will tend to distend the sample easily. Consequently, loading arm (19) pivoted at (17) will have a fast rate wide amplitude of deflection. However, as the sample becomes stiff in response to continuing heat, the deflection of plunger (12) and arm (19) will become increasingly less.

Deflection of loading arm (19) lowers electrode (32) into the electrolytic potentiometer nearer to lead (34), changing the potential of potentiometer output. As the cam (20) continues to rotate in



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Mix a little Durez phenolic resin with nitrile rubber, and notice how the performance curves of the vulcanizate shoot upward.

In a typical recipe, ultimate tensile zooms from 325 to 1330 when you add only 20 parts of resin on 100 parts of nitrile rubber.

Increase it to 50 parts of resin, and tensile goes to 2600. Shore A hardness swings up steeply. Elongation drops off. Stiffness and abrasion resistance both climb.

These properties don't disappear, either, when the going gets rough. After 70 hours at 212°F in air, they're virtually undiminished. You get *more permanence* than with other types of resin.

Fast cure without sulfur: Using 75 parts or less of resin on 100 parts of nitrile rubber, you can cut down on your sulfur and accelerators—and still get a rapid, complete cure.

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Think of the advantage a no-sulfur compound gives you in gaskets or other molded pieces that must coexist with a lead-oxide paint or must remain neutral in an electrical environment.

You can get Durez resins for modifying the properties of nitrile rubber or SBR, natural rubber or Neoprene, and for making solvent-type adhesives that stick better. They come in powders, lumps, liquids, and emulsions to suit your process. To find out more about them, write us for the illustrated bulletin "Durez Resins in the Rubber Industry."

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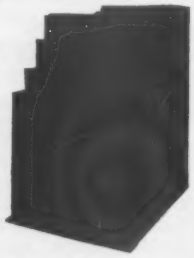

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PATENT REVIEW

a counter-clockwise direction, follower (23) rides up from recess (21) to the surface of the cam, thereby lifting cam rider arm (22) and loading arm (19). This action raises plunger (12) with the rubber sample clinging to its end, and also lifts electrode (32) to the neutral position between the two output leads (33) and (34) of the electrolytic potentiometer (30). Upon further rotation of the cam, the follower again drops into the recess, but by this time more heat has been put into sample (11), changing its plasticity to some extent. If the sample is a vulcanizable, rubbery material containing sulfur and accelerator, continued application of heat will cause it to stiffen. Then, as the cam (20) rotates through a number of successive turns, the output of the electrolytic potentiometer will change in proportion to the change in modulus of the sample.

Non-Crumbing Eraser

U.S. Patent 2,919,180, issued Dec. 29, 1959, to Charles L. Smith and Benson G. Brand, assigned to Mrs. Naomi Burrows, provides a non-crumbling eraser composed of rubber, polyisobutylene and an abrasive material. The eraser, whether hard or soft, retains its crumbs when rubbed against paper. It is especially useful as a typewriter eraser.

Optimum results are obtained by using 30 to 50 parts of polyisobutylene per 100 parts of smoked sheet natural rubber. If more than this is used, the eraser becomes sticky and tacky. If less is used, the eraser does not retain its non-crumbling characteristics.

Masticating and Softening Agent

U. S. Patent 2,895,933, issued July 21, 1959 to Konrad Hopfner and Ernst Gotte, assigned to Dehydag, Deutsche Hydrierwerke G.m.b.H., provides a masticating and softening agent for compounding rubber and rubber salts of the electroneutral organic type. The salts are obtained by reacting equimolecular amounts of anionic and cationic surface-active compounds, e.g., dodecyl sodium sulfate and dimethyl cyclohexyl dodecyl ammonium chloride.

The addition of these salts considerably facilitates mastication and shortens its duration. By their use the rubber composition softens and acquires a certain stickiness which is of advantage in further processing. A very favorable effect is also obtained with respect to the incorporation and distribution of conventional rubber additives in the rubber composition, especially of reinforcing agents and pigments.

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PATENT REVIEW

Bonding Cord to Rubber

U.S. Patent 2,917,422, issued Dec. 15, 1959 to Richard C. Waller and assigned to Goodyear Tire & Rubber Co., describes a method of bonding cord to rubber.

The cord is dipped in a relaxed condition into a dilute aqueous solution of a bonding agent, and maintained in this relaxed condition to permit the solution to wet the cord and to penetrate the interstices of the innermost filaments. The dilute solution has a solids content up to 7 per cent by weight, partially filling the interstices of the innermost filaments of the cord, to prevent inter-filament abrasion after subsequent drying.

Increased tension is then applied to the wet cord to align and compact the filaments into a dense layer so that the volume of the interstices is decreased. A second aqueous solution of a bonding agent is then applied to the wet cord while maintaining the increased tension. The second solution has a greater solids concentration than the first, and provides a cord to rubber bond. The wet cord is then dried while maintaining the increased tension, and the dried cord is imbedded in rubber.

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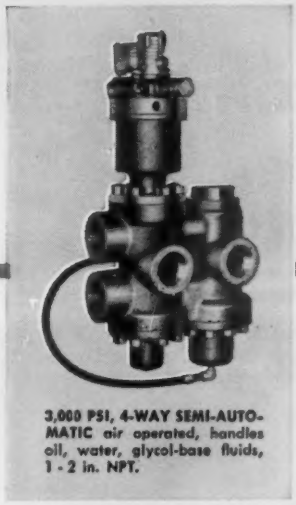
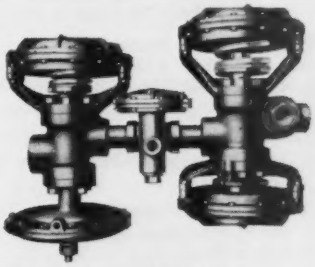
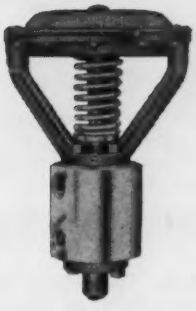


3,000 PSI, 4-WAY SEMI-AUTOMATIC air operated, handles oil, water, glycol-base fluids, 1 - 2 in. NPT.

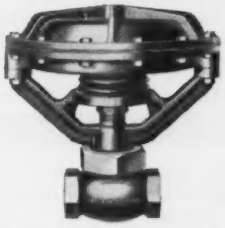
300 PSI, 3-WAY OR REVERSE ACTING bridge yoke, triple-guided stem, ¼ - 3 in. NPT.



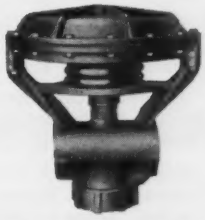
4,000 PSI, 3-WAY AUTOMATIC 2-pressure, auto-neutral, throttling, ½ - 3 in. NPT.



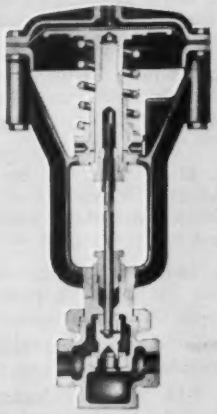
4,000 AND 6,000 PSI, 2 AND 3-WAY BALANCED NC or NO, pressure above or below seats, ½ - 2 in. NPT.



150 AND 300 PSI, DIRECT ACTING globe body, top-guided stem, ¼ - 3 in. NPT.



150 PSI, 3-WAY OR REVERSE ACTING, ¼ - 3 in. NPT VACUUM, 2-WAY, 1 - 3 in. NPT compact design, positive sealing, bridge yoke.



250 PSI, 2-WAY V-PORT MODULATING controls temperature, pressure or flow, direct or reverse acting, ½ - 2 in. NPT.

FOR HOT OR COLD RAW WATER, OIL, AIR, STEAM SERVICE
2, 3, AND 4-WAY • SINGLE OR TWO PRESSURE
HIGH OR LOW PRESSURE • AIR OPERATED
AUTOMATED OR REMOTE MANUAL CONTROL
IDEAL FOR CENTRAL RAW WATER HYDRAULIC SYSTEMS

Chances are, you'll find the answer to your control valve problems in Sinclair-Collins' line. Sound design and highest quality construction . . . Stellite stem seats, Monel stems, hardened replaceable body seats, heavy-duty bronze, ductile iron or cast steel bodies . . . these and many other features assure leak-free performance . . . resistance to corrosion . . . elimination of seat wire drawing . . . longest service life.

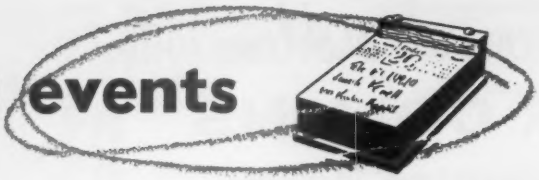
For application engineering recommendations, contact your nearby Sinclair-Collins field engineer.

For more information, write for Bulletin SC-59. Address The Sinclair-Collins Valve Company, Akron 11, Ohio, Dept. RA-660.

The SINCLAIR-COLLINS VALVE Co.
DIVISION OF INTERNATIONAL BASIC ECONOMY CORPORATION (IBEC)
AKRON 11, OHIO

B129

coming events



June 17. Akron Rubber Group, Summer Outing, Firestone Country Club, Akron, Ohio.

June 17. Boston Rubber Group, Summer Outing, Andover Country Club, Andover, Mass.

June 17. Northern California Rubber Group, Annual Golf Outing, Green Hills Country Club, Millbrae, Calif.

June 18-26. Plastics Industries Exhibition, Europlastica 60, Ghent, Belgium.

June 19-22. American Institute of Chemical Engineers, Del Prado Hotel, Mexico City, D.F.

June 20-24. Gordon Research Conferences, Information and Documentation, New Hampton School, New Hampton, N. H.

June 20-July 5. Chicago International Trade Fair, Navy Pier, Chicago, Ill.

June 21-30. International Chemical Exhibition, Belgrade, Yugoslavia.

June 24. Detroit Rubber & Plastics Group, Summer Outing, Western Country Club, Detroit, Mich.

June 26-July 1. American Society for Testing Materials, Annual Meeting, Chalfonte - Haddon Hall, Atlantic City, N. J.

June 27-July 3. International Federation of Automatic Control, First Congress, Moscow, U.S.S.R.

June 29-July 1. Committee D-11 on Rubber and Rubber-Like Materials, ASTM, Annual Meeting, Chalfonte-Haddon Hall, Atlantic City, N. J.

July 4-8. Gordon Research Conferences, Polymers, Colby Junior College, New London, N. H.

July 4-8. Western Canada Trade Fair, Brandon, Manitoba, Canada.

July 4-9. Society of Chemical Industry, Annual General Meeting, Bristol, England.

July 11-15. Gordon Research Conferences, Statistics in Chemistry and Chemical Engineering, New Hampton School, New Hampton, N. H.

July 13-16. Silver Bay Conference on Human Relations in Industry, Silver Bay, N. Y.

July 18-22. Gordon Research Conferences, Corrosion, Colby Junior College, New London, N. H.

July 18-22. Gordon Research Conferences, High Pressure Research, Kimball Union Academy, Meriden, N. H.

July 18-22. Gordon Research Conferences, Radiation Chemistry, New Hampton School, New Hampton, N. H.

July 22. Chicago Rubber Group, Annual Golf Outing, St. Andrews Country Club, Chicago, Ill.

July 25-29. 13th International Congress on Occupational Health, Waldorf-Astoria Hotel, New York, N. Y.

Aug. 1-5. Gordon Research Conferences, Instrumentation, Colby Junior College, New London, N. H.

Aug. 2. New York Rubber Group, Annual Golf Outing, Forsgate Country Club, Jamesburg, N. Y.

Aug. 7-13. Columbia University Industrial Research Conference, Arden House, Harriman, N. Y.

Aug. 8-12. Gordon Research Conferences, Chemistry and Physics of Solids, Kimball Union Academy, Meriden, N. H.

Aug. 14-17. American Society of Mechanical Engineers-American Institute of Chemical Engineers, Joint Heat Transfer Conference and Exhibit, Statler-Hilton Hotel, Buffalo, N. Y.

Aug. 15-25. International Symposium on the Chemistry of Natural Products, Melbourne, Canberra and Sydney, Australia.

Aug. 19. Philadelphia Rubber Group, Annual Summer Outing, Manufacturers' Country Club, Oreland, Pa.

Aug. 28-Sept. 6. Third Materials Handling Exhibition, Oslo, Norway.

Aug. 29-Sept. 2. Gordon Research Conferences, High Temperature Chemistry, Kimball Union Academy, Meriden, N. H.

Sept. 6-7. Chemical Institute of Canada, Organic Chemistry Subject Division, Divisional Conference, Edmonton, Alberta, Canada.

Sept. 6-16. Product Engineering Show and Machine Tool Exposition, Navy Pier, Chicago, Ill.

Sept. 7-9. American Society of Mechanical Engineers, Joint Automatic Control Conference, Massachusetts Institute of Technology, Cambridge, Mass.

Sept. 8-9. Textile Quality Control Association, Fall Technical Meeting, Clemson House, Clemson, S. C.

Sept. 8-9. Tenth Canadian High Polymer Forum, Alpine Inn, Montreal, Quebec, Canada.

Sept. 8-10. Chemical Institute of Canada, Western Regional Conference, Regina, Saskatchewan, Canada.

Sept. 10. Connecticut Rubber Group, Technical Meeting.

Sept. 10. Northern California Rubber Group, Summer Outing.

Sept. 10-17. Fifth International Instrument and Measurements Exhibition and Conference, Stockholm, Sweden.

Sept. 11-14. National Tire Dealers & Retreaders Association, Annual Convention and Trade Show, Kansas City, Mo.

Sept. 11-16. American Chemical Society, 138th National Meeting, New York, N. Y.

Sept. 12. International Rubber Study Group, 15th Meeting, Kuala Lumpur, Malaya.

Sept. 12-16. International Rubber Shipping and Packing Conference, Singapore, Malaya.

Sept. 12-16. International Instrument-Automation Conference and Exhibit, Los Angeles, Calif.

Sept. 13-16. Division of Rubber Chemistry, American Chemical Society, Fall Meeting, Hotel Commodore, New York, N. Y.

Sept. 21-23. Society of the Chemical Industry, Plastics and Polymer Group Symposium, London, England.

Sept. 26-Oct. 1. International Conference on Natural Rubber Research, Kuala Lumpur, Malaya.

October 4-7. International Rubber Conference, West Berlin, Germany.

Oct. 9-12. American Society of Mechanical Engineers, Rubber and Plastics Conference, Lawrence Hotel, Erie, Penna.

Oct. 17-19. International Congress on Technology of Plastics Processing & International Plastics Exhibition, Amsterdam, Netherlands.

Oct. 11-13. Second International Synthetic Rubber Symposium, Church House, Westminster, London, England.

Oct. 19-26. Second International Plastics Fair, Macroplastics, Utrecht, The Netherlands.

HOW SULFASAN R ANSWERS YOUR CURING NEEDS IN NONBLOOMING, SCORCH-FREE, HEAT-RESISTANT COMPOUNDS OF SBR AND NATURAL RUBBER

Results with scores of different stocks compounded with SULFASAN R, powerful organic-type vulcanizing agent, all show increased heat resistance, greatly reduced scorch . . . and *no bloom* even after months of aging.

Economical SULFASAN R frequently trims costs, too . . . substantially reduces the total amount of curing agents required. About 1% of SULFASAN R on the rubber plus a small amount of THIURAD (tetramethylthiuram disulfide) achieves good results with most SBR and natural compounds.

Without SULFASAN R—*Stock Blooms Readily*

With SULFASAN R—*No Bloom at All*

SPECIFICATION: Withstand 70 hours @ 250° F. and 24 hours @ 325° F. in air oven without cracking when flexed 180°

COMPOUNDS	A	B	C
SBR 1500	100	100	100
Black	75	75	75
Zinc Oxide	5	5	5
Stearic Acid	1	1	1
Santoflex 75	1	1	1
Flectol H	2	2	2
Santocure	2	2	2
THIURAD	3.5	1.25	1.25
SULFASAN R	—	1.25	0.75
CURING AGENT COST	$3.99	$3.36	$2.59
TYPICAL RESULTS			
Mooney Scorch (Large Rotor @ 250° F.)			
Minutes for 10-point rise	8	11½	13
Unaged			
Tensile, psi	1880	2130	2070
Elongation, %	480	440	515
Hardness	60	60	59
Aged 70 Hours @ 250° F.			
Tensile, psi	2100	2260	2210
Elongation, %	260	235	290
Hardness	69	69	68
BLOOM	Immediately	None in 9 months	None in 9 months

SULFASAN R gives excellent aging at reduced cost . . . won't stain or discolor white rubbers. SULFASAN R disperses readily. Works well for butyl and Buna-N as well as SBR and natural rubbers . . . especially when used with SANTOCURE and other sulfenamide accelerators.

For further information about unique SULFASAN R, or help with a compounding project, write or phone, today.

Monsanto

MONSANTO CHEMICAL COMPANY
Rubber Chemicals Dept.
Akron 11, Ohio
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SANTOFLEX, SANTOCURE, FLECTOL, THIURAD, SULFASAN: T. M.'s, Monsanto Chemical Company

how to vastly increase the useful life of rubber...

Effect of Curing System on Antiozonant Retention in SBR Stocks after Vulcanization

(All contain 3.0 phr UOP 88; 40.0 phr HAF black)

Compound	Accelerator	Sulfur, phr	% Extractable Antiozonant
1082....	2.0 phr benzothiazyl disulfide	2.0	86.4
1083....	1.0 phr benzothiazyl disulfide	2.0	78.6
1087....	None	2.0	~100.0
1088....	1.0 phr benzothiazyl disulfide	3.0	74.6
1083....	1.0 phr benzothiazyl disulfide	2.0	78.6
1089....	1.0 phr benzothiazyl disulfide	1.0	68.6
1083....	1.0 phr benzothiazyl disulfide	2.0	78.6
1084....	1.0 phr N-cyclohexyl-2-benzothiazole sulfenamide	—	—
1093....	1.0 phr diphenylguanidine	2.0	~18.0
1085....	2.0 phr tetramethylthiuram disulfide	—	35.0
1090....	4.0 phr tetramethylthiuram disulfide	—	12.0

The SBR specimens below were exposed to ozone at 100°F with 20 percent elongation for 52 hr. at 33 pphm ozone, then 187 hr. at 63 pphm ozone.

Carbon black—HAF (high abrasion furnace), Curing system—4 phr tetramethylthiuram disulfide; Hours to first crack—7 to 23.

Carbon black—HAF (high abrasion furnace), Curing system—2 phr sulfur, 1 phr N-cyclohexyl-2-benzothiazole sulfenamide. No cracks in 239 hr.

CONSIDER THE EFFECT OF YOUR CURING SYSTEM ON THE EFFECTIVENESS OF A CHEMICAL ANTIOZONANT

In compounding rubber, there are several things which are important in assuring maximum crack-free life. First, you must use a potent antiozonant like UOP 88 or 288. Next, consider what a vast difference in effectiveness can be realized by your *curing system.*

The right antiozonant used in correct proportion is of primary importance. Then, by using the proper accelerator, you can promote its maximum effectiveness, and thus contribute to maximum ozone protection.

Look at the two rubber test strips illustrated. Both were formulated with UOP 88 . . . but note how much more effectively the antiozonant worked when accompanied by this change in curing systems—a vast increase in resistance to cracking. The table above the test strips shows how the *proper* accelerator aids antiozonant effectiveness.

Help in achieving maximum effectiveness from UOP 88 or 288 antiozonants in your rubber formulations is available through UOP facilities and technical personnel. Just write or telephone our Products Department.

WHERE RESEARCH TODAY MEANS PROGRESS TOMORROW

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UNIVERSAL OIL PRODUCTS COMPANY
30 Algonquin Road,
Des Plaines, Illinois, U. S. A.

UOP ozone cabinets provide test conditions at a wide range of ozone concentrations.

PHILBLACK* PRIMER

NEW
MODEL

I is for Important Improvement in tires!

You can make tough tire carcasses and treads with Philblack I and get superior flex life, excellent heat dispersion and longer tread life than with *conventional* black tread compounds.

The four Philblacks, each with its own special advantages, can be used separately or as a team to give you just what you need in your rubber product. See your Phillips technical representative for prompt service and expert advice. No obligation, of course!

*A trademark

LET ALL THE PHILBLACKS WORK FOR YOU!

A — **Philblack A, Fast Extrusion Furnace Black.** Excellent tubing, molding, calendering, finish! Mixes easily. Disperses heat. Non-staining.

O — **Philblack O, High Abrasion Furnace Black.** For long, durable life. Good conductivity. Excellent flex life and hot tensile. Easy processing.

I — **Philblack I, Intermediate Super Abrasion Furnace Black.** Superior abrasion. More tread miles at moderate cost.

E — **Philblack E, Super Abrasion Furnace Black.** Toughest black yet! Extreme resistance to abrasion.

PHILLIPS 66

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MAGNESIUM OXIDE

Three activity grades give you ideal process safety for every type of recipe

Cut down on costly throw-away loss caused by scorch. Get better bin stability . . . better states of cure by using an *activity-controlled* ELASTOMAG oxide from Morton. Three precision activity grades of ELASTOMAG—170 (high), 100 (medium), and 20 (low)—let you choose the oxide with a Morton Activity Index (MAI) that's ideal for every stock. New ELASTOMAG Micro-Pellets eliminate dusting problems. No binder or treating agent is used. In the mixer, Micro-Pellets break down to minute particles . . . provide the same superior dispersion as ELASTOMAG in the powdered form.

Get new ELASTOMAG Bulletin that summarizes tests on Neoprenes, Hypalon, and Fluoroelastomers. See how you can increase production with a new ELASTOMAG oxide. Ask your Morton Man for a copy now. Phone or write distributors below.

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HALLCO NEWS

Issued by
The C. P. Hall Co.
Chemical Manufacturers

No. 10

USERS REPORT STABILITE GIVES OUTSTANDING RESULTS AT LOWER COST

Unlike the majority of antioxidants, Stabilite shows a measurable beneficial effect on ozone resistance, as reported by a manufacturer of tires used on automotive farm equipment. In combination with a petroleum wax Stabilite further improved anti-checking properties. Another tire company in an airbag application uses 3¼ parts of Stabilite to 100 of rubber hydrocarbon. It obtains these beneficial results:

- **Better splicing due to Stabilite's plasticizing action.**
- **Better adhesion to metal valves.**
- **Better surface condition in use because Stabilite stays smooth longer.**
- **Reduction of circumferential cracking.**
- **Improved handling before curing.**
- **Lower cost.**

Still another tire manufacturer finds that Stabilite, used in the cushion stock containing natural rubber, produces excellent adhesion and shows less tendency for tires to lose their treads. This company credits Stabilite's peptizing action for the improved adhesion obtained. Stabilite added at the beginning of the mixing cycle of GR-S effectively reduces "nerve" and dryness, improves tack and prevents gel formation.

For further information and samples write: The C. P. Hall Co., Akron 8, Ohio, Exclusive distributors for Chemeco, Inc., manufacturers.

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capitol cue

THE NEXT RECESSION WON'T HIT BEFORE 1961, and when it does it will be moderate and short. That's the nearly unanimous opinion of the government's top economists. Put another way, they are optimistic about business until the early part of next year. These experts count on spending for new plant capacity to keep rising smartly--up 14% to 16% this year. Inventory building is expected to keep factory output high, though the rate of accumulation may slow. And consumer spending, which spurted this Spring, will also stay high.

For 1961, the analysts don't see how we can escape a slide. A reversal of current favorable factors next year is the big reason behind this conclusion. Business spending--for new capacity and for inventory--will turn down. Consumers aren't expected to keep buying cars and appliances at the 1960 rate. Finally, the federal Budget will begin to show considerable black ink; the Treasury will be taking in less than it spends.

The 1961 slide will be mild, like 1953-54 and 1957-58. Why? Because business isn't racking up serious excesses that will need correction. What's more, the "built in stabilizers"--unemployment insurance, etc.--will be cushioning the impact. Then, after less than a year, housing, investment, and higher consumer spending will begin to bring about the recovery.

Here's what is likely to happen to key indicators in 1961:
- Total output of goods and services--Gross National Product--will drop only 3-5% from the $520 billion rate at year-end.
- Industrial production will fall sharply--perhaps 10% or so.
- Personal income will decline only 1% or 2%, as unemployment insurance, social security, and other benefits ease the dip.

CONSUMER PRICES MAY RISE MORE THAN WAS EXPECTED at the start of the year, government experts are predicting. Rising food prices are the reason for this new outlook--meat and vegetables, especially. For the first time in two years, food prices will be reinforcing increases in rents, services, etc. Up to now, food has been an offsetting factor, holding the Indexes down. By year-end, Consumer Prices may reach 128% of the 1947-49 base--not the 127% that was forecast earlier. The recent level has been 125.7%.

This rising trend in prices doesn't foreshadow a new round of inflation. For one thing, the food increases are flukes, the result mainly of bad weather which hurt crops and held up marketings. And wage hikes won't be any greater than in the past year. Nonfood prices will be rising only a little.

THE OUTLOOK FOR EXPORTS IS ONE OF THE BRIGHT SPOTS in the business picture. Shipments abroad in the first quarter topped those of a year ago by 21%. High-level industrial activity abroad is creating heavy demand for U.S. goods. And their prices are proving to be quite competitive. What's more, government programs have proven helpful in financing foreign sales.

capitol cues (cont'd)

CORPORATE PROFITS AREN'T RUNNING AS STRONG as forecast at the start of this year, a survey of first-quarter earnings of more than 500 corporations shows. The increase so far this year is only 7% over a year ago, compared to estimates of 15% or 20% made in January. And with the economy leveling, the quarterly gains for the rest of the year will be smaller. So 1960 profits may be $50 billion, not the $54 billion expected; they reached $48 billion in '59.

Here's why corporate profits are running behind forecasts:
-Costs are rising faster than productivity--a switch in trend.
-Output is being cut in durables only partly offset elsewhere.

Here's how first-quarter 1960 net compares with early 1959:
-Largest increases were registered in machinery (up 25%), stone, clay and glass (17%), office equipment (12%), steel (12%), drugs (11%), finance (10%), chemicals (10%), and foods (about 10%).
-Smaller gains came in electrical equipment (9%), utilities (9%), autos (9%), paper (8%), oil (6%), car parts (4%), and coal (3%).
-Declines showed up in nonrail transport (down 95%), nonferrous metals (16%), building material (15%), rubber (10%), rails (2%).

CONGRESS FACES A LOGJAM OF LEGISLATION in the remaining weeks of this session as a result of time lost in the long fight over civil rights. Only the most essential bills will get through, and those will be in line with the moderate philosophy of the top Democratic leadership in both Houses. Threats of vetoes will be strong enough to head off big spending measures, too. The bills killed generally will be those to which businessmen have been opposed.

On the issues still pending, here's what Congress will do:
-The Budget--Eisenhower's spending ceiling will largely be held.
-Taxes--Present excise and income rates will be extended. Ike won't get the gas tax hikes he wants. Passage is doubtful for bills on private pension funds and on foreign earned profits.
-Social security--Benefits will be expanded by as much as 10%.
-Education--The bill to construct classrooms won't get through.
-Labor--The minimum wage will be raised to $1.10 or $1.15 per hour; coverage, too, may be expanded to large retail outfits.
-Postal rates--Congress won't vote the increases Ike proposes.
-Housing--The outlook is gloomy for the Democrats' big measure.
-Health--Some health insurance bill for the aged may yet get by.
-Bond rates--The Democrats will block a hike in interest rates.

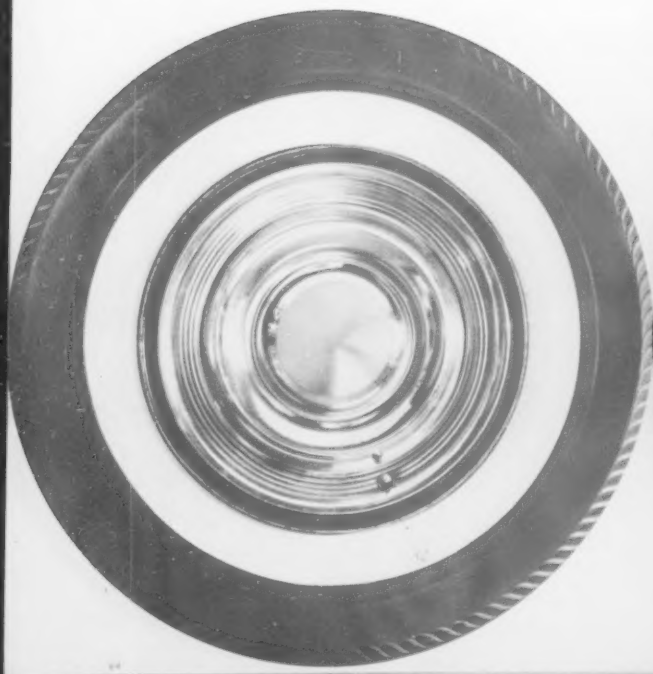
BUSINESS FAILURES WILL GO UP THIS YEAR, despite the general prosperity. Government economists attribute this gloomy prediction to two prime factors. Credit will remain scarce for most small businessmen, though money has eased a bit. Many new, small firms have been so hard pressed that they won't find it possible to hang on. Competition is also expected to be tougher this year than in recent years. Hardest hit will be firms in the food, clothing, and service lines. The number of bankruptcies will rise 10% in 1960, to 15,500.

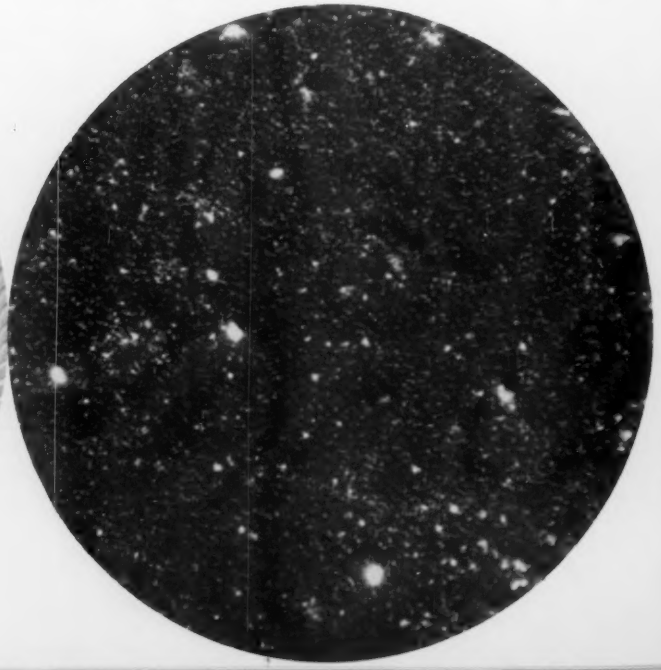
HOW YOUR EMPLOYEES SHOULD HANDLE THEIR EXPENSES for travel, transport, entertainment, etc., is set out in a pamphlet now available from the Internal Revenue Service. The pamphlet tells what is--and what is not--deductible by employees. It also goes into the reporting and record-keeping requirements employees must meet. The pamphlet is free. Write to IRS, Washington 25, D.C.

TIRES LAST LONGER
WHEN THEY'RE MADE WITH AMERIPOL
MICRO-BLACK
HERE'S WHY...

BETTER CARBON BLACK DISPERSION, MORE ABRASION RESISTANCE WITH AMERIPOL MICRO-BLACK ...THAT'S WHY TIRES LAST LONGER

Illustration 1—Photomicrograph below shows Ameripol 4659, a high dispersion Micro-Black containing 52 parts HAF carbon black. Note how thoroughly and uniformly the black is dispersed in the rubber.





Compare the uniformity of carbon black dispersion in Micro-Black (illustration 1, extreme left) with a counterpart formula, dry-mixed (illustration 2) and a slurry-mixed black masterbatch (illustration 3).

Micro-Black's micron-size particles are thoroughly dispersed in the rubber by an exclusive process—high liquid shear agitation at the latex stage. Result: tires and other products made with Micro-Black have controlled uniformity, superior dispersion, and greater abrasion resistance.

Photomicrographs shown here were made by Dr. Raymond P. Allen of Akron, Ohio, well-known Consultant in Industrial Microscopy. They are certified to be exactly as shown (100 times magnification) and unretouched.

CHOOSE AMERIPOL MICRO-BLACK FOR YOUR RECIPES AND YOU GET NOT ONLY A BETTER END PRODUCT, BUT ALSO:

Savings in time–Since the black is already in the rubber, you eliminate one weighing operation, one mixing operation, and shorten other mixing operations.

Savings in equipment–Elimination of the carbon mixing operation frees equipment for other uses and makes possible increased production without additional investment.

Savings in power–Fewer mixing operations, plus shorter mixing cycles, mean lower power consumption for the same volume of production.

Savings in inventory costs–You purchase and handle only one material–Micro-Black–instead of two–rubber and carbon black. And you need no extra storage space for carbon black, since it's already in the rubber.

Illustration 2—A conventional dry mix masterbatch containing 52 parts HAF carbon black.

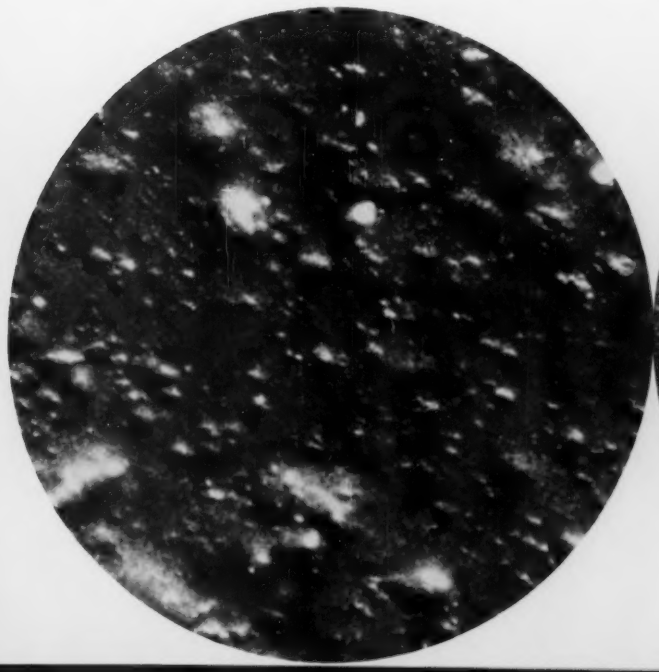
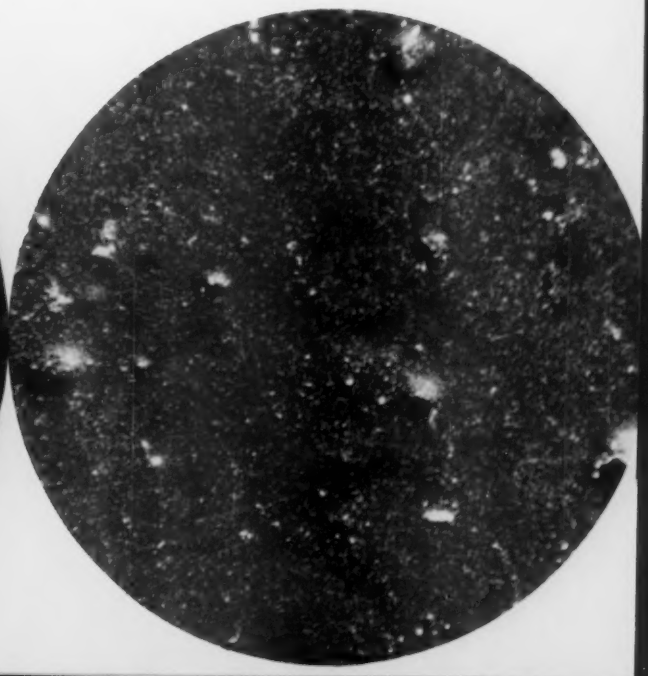


Illustration 3—A black masterbatch containing 52 parts HAF carbon black, mixed by competitive slurry method.



NOW AVAILABLE ...11 TYPES OF AMERIPOL MICRO-BLACK

Whether you're making tires or any other rubber products, you'll find the right masterbatch to meet your requirements in the complete Micro-Black line.

COLD MICRO BLACK	BLACK		OIL		Emulsifier	Stabilizer
	Type	Parts	Type	Parts		
1605	FEF	50	—	—	FA	NS
4659	HAF	52	HA	10	RA	ST
4651	HAF	62.5	HP	12	RA	ST
4660	ISAF	52	HA	10	RA	ST

COLD, OIL MICRO-BLACK	BLACK		OIL		Emulsifier	Stabilizer
	Type	Parts	Type	Parts		
4760	SRF	75	N	17.5	MA	NS
4751	FEF	100	N	50	FA	NS
1805	HAF	75	N	37.5	FA	NS
4750	HAF	75	HA	37.5	MA	ST
4753	HAF	75	HA	50	MA	ST
4759	ISAF	75	A	37.5	MA	ST
4761	SAF	65	A	37.5	MA	ST

HOW TO PUT MICRO-BLACK TO WORK IN YOUR OPERATION

Call your Goodrich-Gulf Sales Engineer. He'll come to your plant and help determine the right recipe and proper grade of Micro-Black for your needs. He'll help you test it, with the full cooperation of the Goodrich-Gulf Technical Sales Service Laboratory.

When you deal with Goodrich-Gulf, you can draw on the production and technical resources of the leader in the field. We offer the world's largest synthetic rubber capacity, and the most advanced laboratory service in the industry. Call or write us at 1717 East Ninth Street, Cleveland 14, Ohio. Plants at Port Neches, Texas and Institute, West Virginia.

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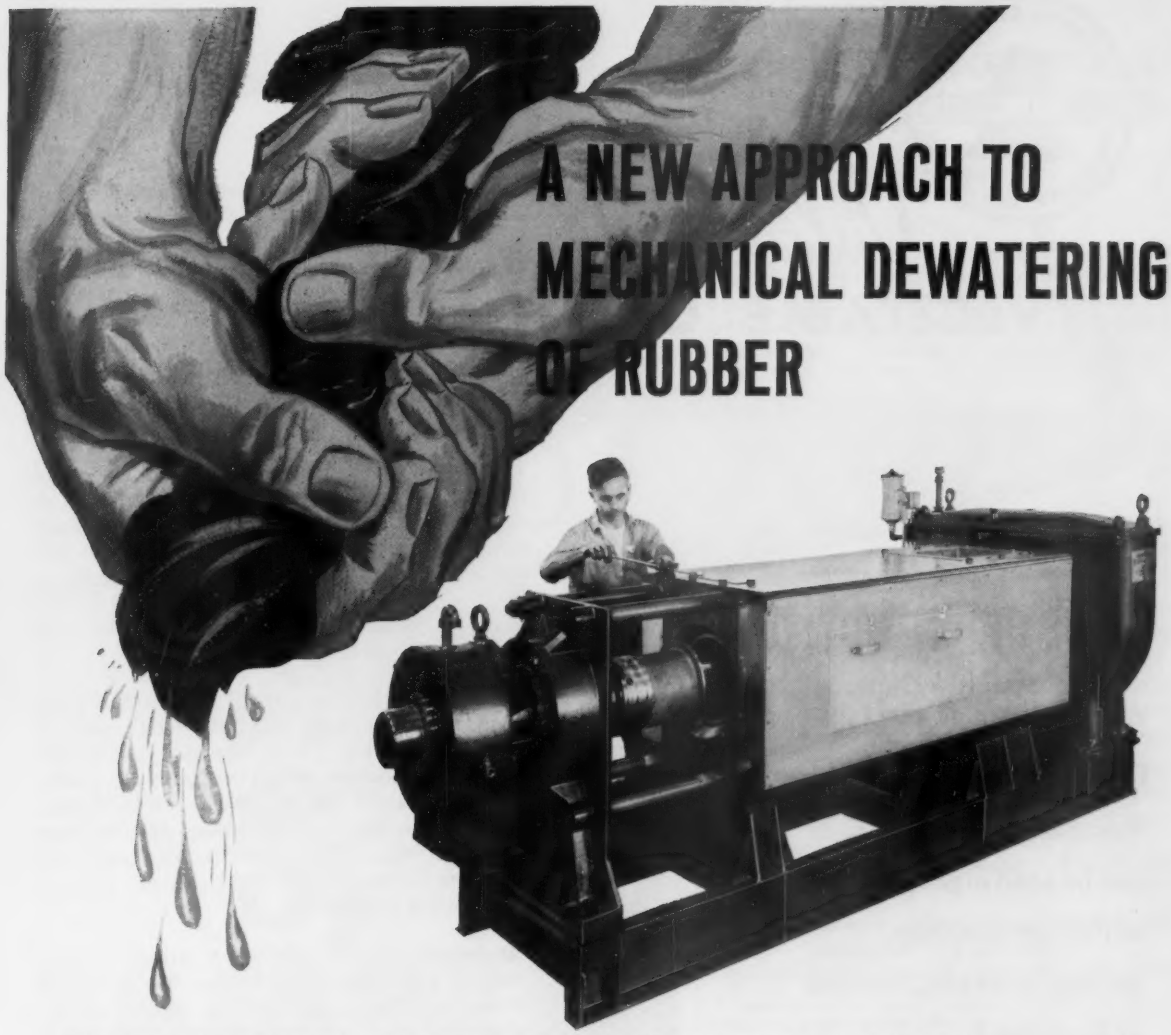
THE ONE TO WATCH FOR NEW DEVELOPMENTS



A NEW APPROACH TO MECHANICAL DEWATERING OF RUBBER

EXPELLER* DEWATERING PROCESS

Mechanical dewatering of rubber by the new Expeller process has aroused the interest of many rubber companies. Following years of research the process has now been industrially accepted and in use for over a year. In fact, major companies are now using a number of these Expellers, preceeding dryers, to take moisture in crumb from 65% to as low as 8%. In actual use, the capacity of drying equipment can be increased two to four times when preceded by an Anderson Expeller. Based on such performance, each of these companies have ordered additional units.

EXPELLER DEWATERING HAS THESE ADVANTAGES

- Increases Drying Capacity
- Agglomerates Minute Crumb particles
- Improves Carbon Dispersion
- Saves on Drying Equipment
- Reduces Dryer Dust
- Dewaters all Types of Natural or Synthetic Rubber

A Pilot Plant in the Anderson Laboratory has dewatered almost every type of synthetic and natural rubber by this Expeller process with excellent results. These data are available to rubber companies. Pilot Plant demonstrations on your product can be arranged.

*Trademarks reg. in U. S. Pat. off & Foreign Countries

THE V. D. ANDERSON COMPANY
1963 West 96th Street • Cleveland 2, Ohio

Gentlemen: We are interested in the Expeller Rubber Dewatering Process. Would you please provide us with additional data.

We are processing (type of synthetic or natural rubber)_____

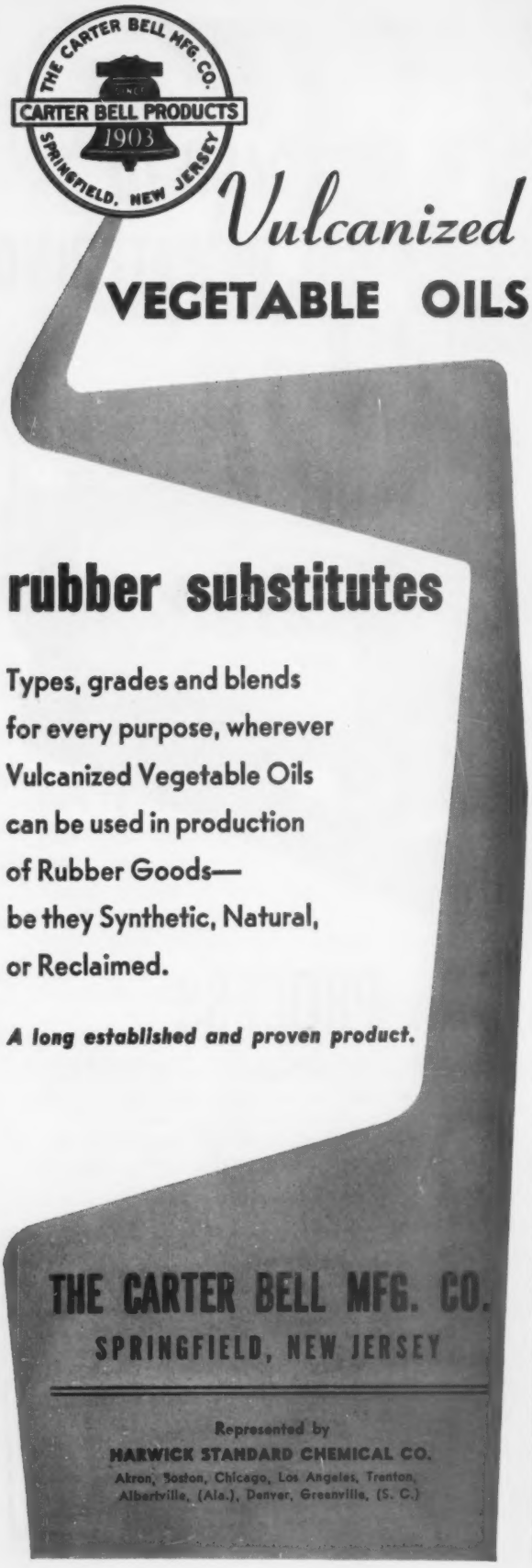
_____

Name _____ *Title* _____

Company Name _____

Address _____ *City* _____ *State* _____

THE V. D. ANDERSON COMPANY
Division of International Basic Economy Corporation



Overseas

Paris—A plant which will extract butadiene for use in making polybutene will be built by Naphtachimie in France. When its polybutene production facilities have been completed, Naphtachimie will be the only producing source of this material in Europe. Process and technical know-how will be provided by Cosden Petroleum Corp., Big Spring, Texas, which has licensed Naphtachimie for the use of its technique for manufacturing polybutene.

Tokyo—The Ministry of International Trade and Industry has approved plans for production of neoprene in Japan by both the Showa Denko and Kanegafuchi companies. Showa Denko and DuPont will launch a joint enterprise, utilizing DuPont technology, whereas Kanegafuchi Chemical will manufacture neoprene using its own technical resources.

Rotterdam—The Netherlands' first carbon black plant, with a capacity of 24,000 tons a year, is now in operation. It is operated by Ketjen-Carbon, Ltd., jointly owned by Godfrey L. Cabot, Inc., and Royal Sulfuric Acid Works Ketjen, Ltd., Amsterdam, and is turning out five types of carbon black. The plant's stainless steel construction is designed to yield carbons with extremely low grit content.

Bucharest—Construction of a British-equipped factory for production of tires has started in Rumania. The factory will be capable of producing about 1 million tires a year and will be completed in 1962. Cost of equipment purchased in Britain last year was more than $20 million.

Hanover—West German manufacturers produced 228,000 tons of rubber tires last year, an increase of 21 per cent over 1958, according to the Continental Gummi-Werke A.G., West German tire maker.

Moscow—The Soviet Union plans to invest about $25 billion in chemical facilities during her current Seven Year Plan (1959-65). About $12 billion of this will be for synthetic rubber, plastics, and fibers. Production of synthetic rubber, which was started in Poland in 1959, will be introduced in Czechoslovakia during the plan period.

Paris—The French firm Ugilor will design and build a plant to make acrylonitrile from propylene and ammonia, utilizing patents owned by Britain's Distillers Co., under an agreement with that company. Distillers has been working on the process for several years, but does not make acrylonitrile itself.

Wink Cutter increases production for O-Ring manufacturer

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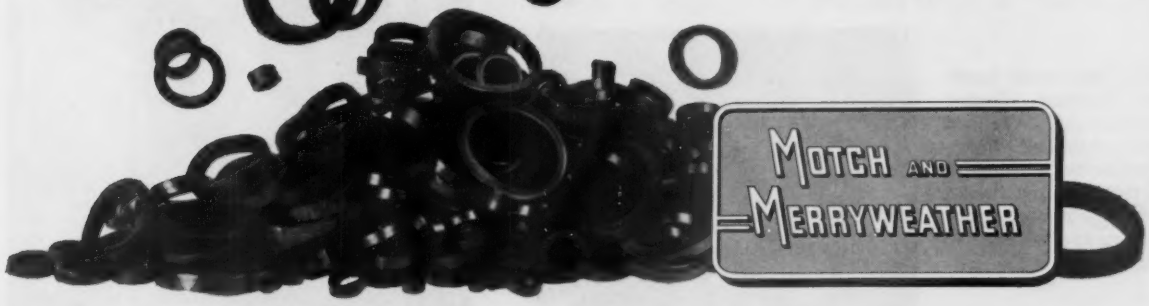

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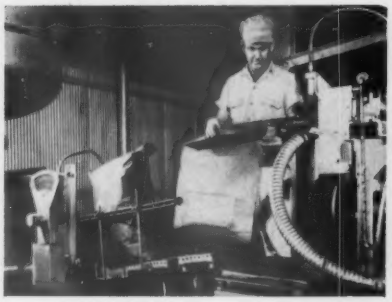

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Here at Polymel our life is brightened by our gallery of fine paintings from the talented fingers of the world's renown masters. The one which we have photographed is the priceless work of Vecelli Tiziano. Many others admired by our clients and co-workers include:

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SALE AGENTS: Summit Chemical Co. Akron, Ohio

• An unidentified burglar rifled the research and development departments of the Dunlop Corporation in Hanau, Germany. Evidently nothing was stolen, but the manager of the department discovered that the mysterious burglar had tampered with a newly-developed machine.

The machine was well protected and concealed, but the burglar broke down the barriers protecting it and pushed several levers. The machine was developed to manufacture special tires of outstanding quality. Dunlop announced several weeks ago that it had succeeded in developing a phenomenal new tire.

• The German minister of economics has terminated the subsidies paid to the German synthetic rubber industry as of May 1. German factories processing natural rubber, latex, and imported synthetic rubber have been compelled, as was only recently discovered, to pay a certain sum to a clearing and balancing office (Preisausgleichskasse Kautschuk) since 1952. The amounts collected have been turned over to the Buna production of the Chemical Works Huels A. G. to facilitate the development of synthetic rubber in Germany.

The termination of this subsidy had been considered for some time as the Buna factory no longer requires assistance. The ending of the subsidy is also partly due to the European common market treaty and the shipping of synthetic rubber, produced by Italian manufacturers, to Germany.

• For a number of years there have been only a few strikes in German industries; at present there is such a dearth of workers that it is impossible to increase production because of the small size of the labor force. In order to relieve the situation, German Industry is forced to import labor from Italy and other adjacent countries. In fact, in some instances the local governments of the states have advised certain industries to move from larger cities to rural sections where it is easier to recruit labor.

At the beginning of the year rumors circulated in Germany to the effect that there would be a number of strikes during 1960 aimed at forcing a shortening of the work week, gaining an increase in wages, and achieving several other benefits. Right now, Hamburg's rubber industry is threatened by a major strike. Negotiations with about 12,000 workers of the Hamburg rubber industry have broken down.

The last contract was terminated as of April 30, and the union is demanding a 12 per cent wage increase, a shortening of the work week from 44 to 42½ hours, and a few minor concessions. The spokesman for the industry suggested a 7.8 per cent wage increase, and a 43 hour week. The union rejected this proposal and the members of the union will take a strike vote.

The industry maintains that the union—which also represents sections of the chemical, paper and ceramics industry—has accepted a 44 hour week in other instances. Furthermore, it claims that a 42½ hour week would greatly hamper the processing and completion of daily orders and would also aggravate problems caused by the shortage of manpower in individual factories.

• The first synthetic rubber factory in Japan, near Yokohama, is owned by Japanese Geon Ltd., Tokyo, a subsidiary of the B. F. Goodrich Co., Akron, Ohio. The factory went on stream late last year and has an annual capacity of 8,400 tons.

• International capital has, for quite some time, been attracted by the excellent performance of various companies which produce natural rubber. In its financial report for 1959, United Sua Betong Rubber Estates Ltd., the largest rubber plantation in Malaya, reports that it has increased its gross profits by more than 60 per cent for a total of £1.15 million ($3,231,000). Net profit amounted to £691,400 ($1,942,834), a remarkable increase when compared with last year's profit of £413,000 ($1,160,-530).

Dividends have been raised from 37½ per cent to 50 per cent of the net profits.

• Prompted by a growing volume of orders, the Continental Gummi-Werke A. G. in Hanover has put a great deal of effort into increasing its labor force. During February, for the first time in the history of the organization, 24,000 people were working for the company, a thousand more than in last October, and a high figure in view of the dearth of labor in Germany.

• The Rubber Association of Singapore and Malaya has finally been organized by the Rubber Trade Association committee representing the Chinese portion of the trade in Singapore. As of May 1 the new organization encompasses the entire Singapore

and Malayan Federation rubber trade. The Rubber Association of the Chamber of Commerce of Singapore, and the Rubber Trade Association of the Malayan Federation are also members of the new organization.

All members will enjoy equal rights, and management will be composed of both Chinese and Europeans. The organization will supervise the clearing and equalization balance fund. In 1958 this institution spent $340 million (Malayan), equal to $112 million in American currency, for 1.14 million tons of rubber.

• During the last general meeting of the Indian Section of the Institution of the Rubber Industry, held in Calcutta, the president of the group pointed out that only ten years ago natural rubber was being exported from India. Now India is importing very substantial quantities of natural and synthetic rubber to meet the demands of manufacturers.

During 1955 natural rubber production in India amounted to 22,480 tons, increasing to only 24,750 tons in 1959. However, rubber consumption during the same period has increased from 27,500 tons in 1955 to 43,600 tons in 1959—an increase of almost 60 per cent.

The development scheme for raw rubber, which has been in force for some time, has not yet reached a stage where it can be relied upon to fill the gap between demand and supply. Although the area planted has now reached approximately 300,000 acres, the yield per acre has gone down, with the result that total rubber production does not show any appreciable improvement.

Plans for local manufacture of other raw materials for the rubber industry seem to be progressing, and the Indian Government has licensed two concerns for the manufacture of carbon black. At least two licenses have been issued for rayon tire cord, and another unit is progressing in its plans for the manufacture of rubber chemicals.

It is encouraging to note the progress achieved by rubber industry manufacturers during 1959. Two tire manufacturing firms completed expansion plans and one of them erected a new factory at Madras. A new tire factory has been built in Bombay and production is reportedly just getting under way. The U. S. Export-Import Bank recently approved a loan of 22.5 million rupees ($4,725,000) to set up a new tire factory in Delhi. Another factory is to be constructed in Kerala, and the Government of India has reportedly approved another tire plant in West Bengal.

• The three major foreign-owned oil refineries in India, the Burma-Shell, Standard Vacuum Oil Co., and Caltex, have felt the first direct impact of the Soviet Union's offer to sell oil to India at bargain prices. The Government of India has sent letters to all three companies advising them of the low cost of Soviet crude oil, and asking them to give serious consideration to the possibility of using it because of the price saving and the saving in foreign exchange.

Up to now the entire supply for the three refineries has come from oil fields operated in the Middle East by the companies. The Government of India is said to be negotiating with the Russians for a sizeable quantity of crude oil and other oil products at favorable prices. Soviet Russia has cut the prevailing prices by more than 10 per cent.

• The Pakistan Government has granted permission to construct a new factory in Sui for the production of carbon black. About $7 million will be required to build the installation which will be designed to produce about 16,330 tons of carbon from 70,600,000 cubic feet of natural gas annually. The factory will be owned by a newly-formed corporation, Sui Carbon Co., a joint enterprise of the Burma Oil Co. and Continental Carbon Co., both of which are located in Pakistan. The U.S. Continental Oil Corp. will assist in organizing the new factory.

• Alliance Tire Factory in Israel will increase its production from 7,500 to 12,500 tons a year. Facilities will be enlarged, and almost 5 million Israeli pounds ($2,800,000 in American currency) will be invested. Half of this amount has to be provided in foreign currency. During 1960 the company will export approximately two-thirds of its total production, valued at 4.25 million Israeli pounds ($2,363,000 in American currency).

• Representatives of the entire European rubber industry have met at least once a year since 1953 under the sponsorship of the "European League for Economic Cooperation." Recently, at a meeting in Zurich, the delegates discussed specific problems which will arise from relations between the two European economic zones, the European common market and the Efta (the seven nations free trading zone sponsored by Great Britain). Dr. Robert Bult from Pratteln, Switzerland, acted as chairman of the gathering; during the discussion it was emphasized that both organizations have lowered their national customs duties to a greater extent than during the 13 years of negotiations with GATT (General Agreement of Tariffs and Trade).

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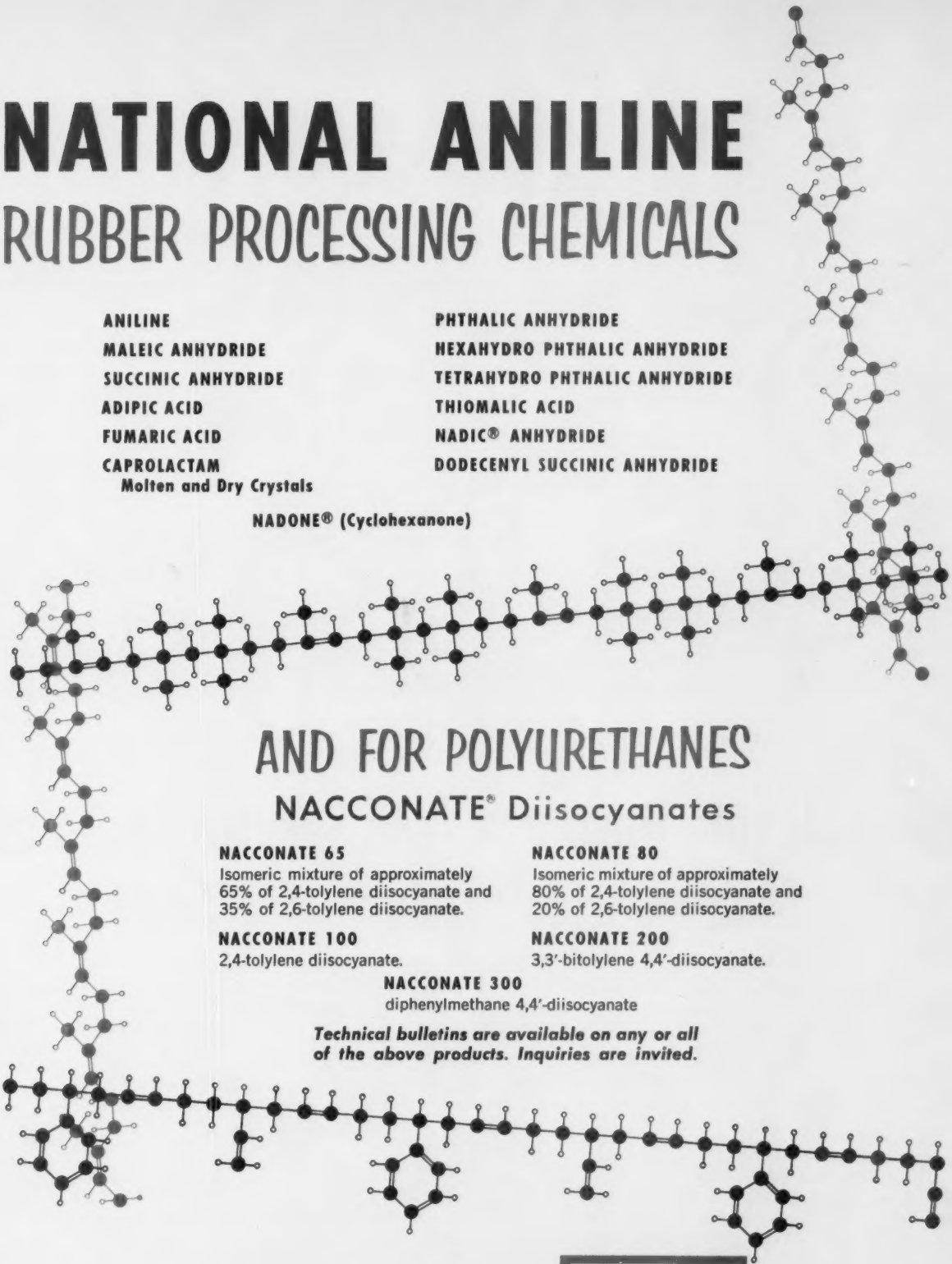

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Technical bulletins are available on any or all of the above products. Inquiries are invited.

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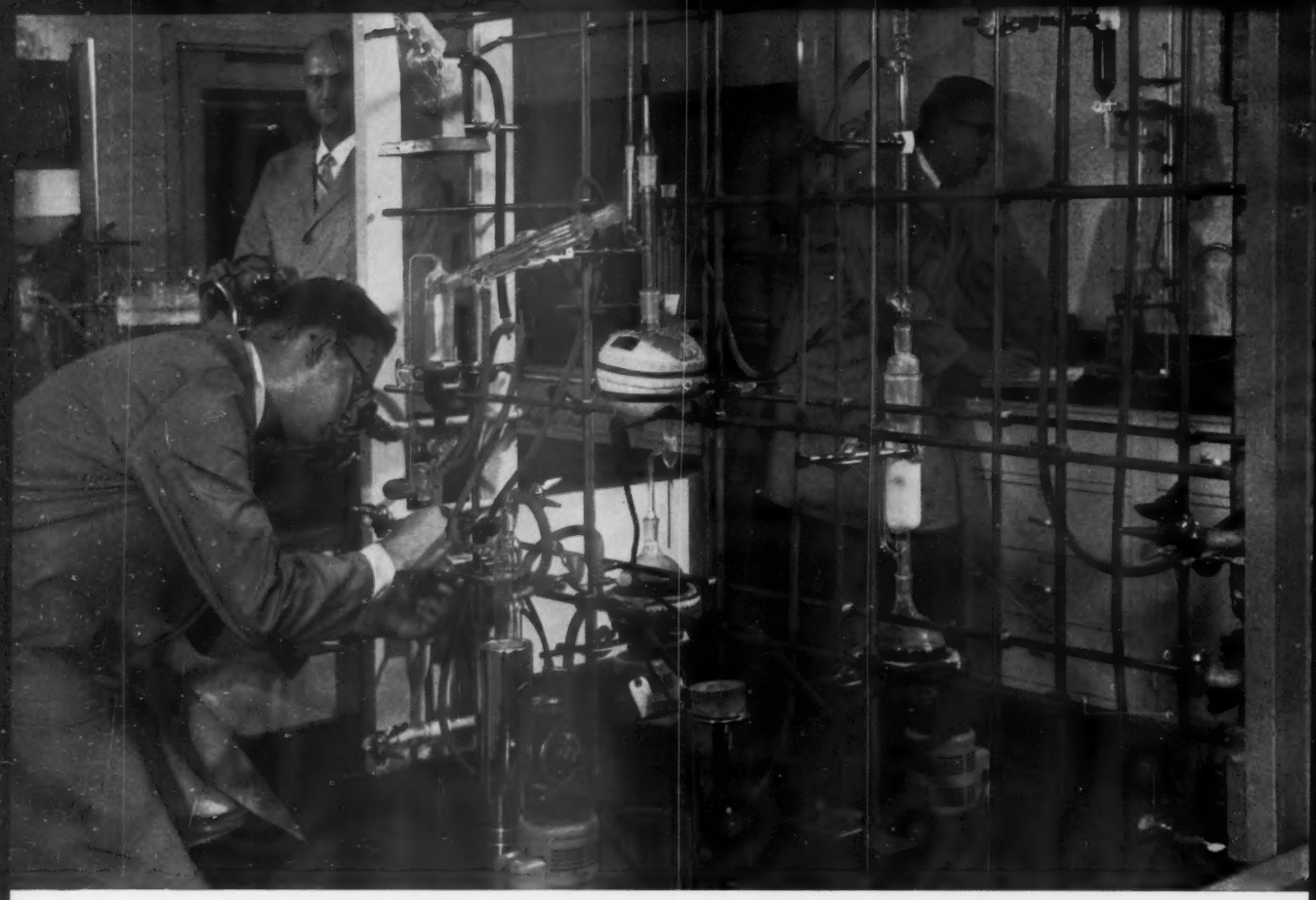


Shown here is one of 13 completely equipped new laboratory units which Neville has recently built as part of a move to bolster basic research. New products are born here—old ones improved.

New Neville Research And Service Facilities Mean Better Products For You

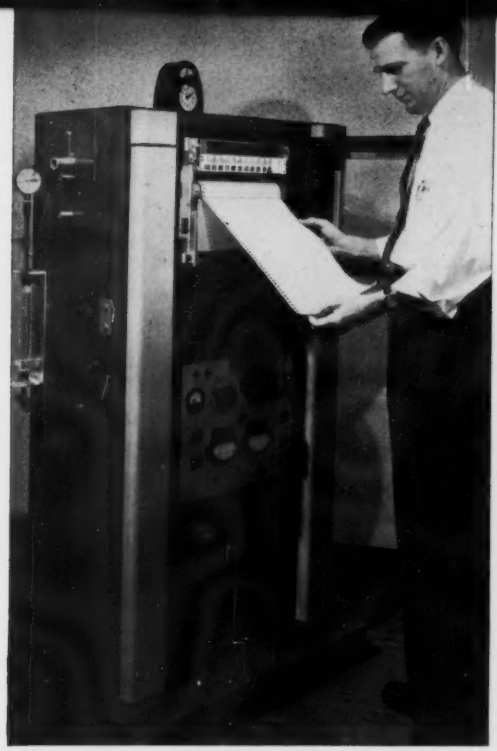
When Neville Chemical Company built its unique office building and research center on Neville Island in Pittsburgh, it did so with its customers in mind. It placed all research, technical service, general administration, sales and even a pilot plant under one roof for quick communications and good coordination. This adds up to better and faster service for you.

Technical facilities were greatly enlarged and divided into four basic sections . . . Technical Service, Research, Process Development and Laboratory Service. In the last three departments, Neville scientists and technicians are constantly striving to find new polymers and chemicals to increase the ability of Neville products to improve those of its customers. In addition, these departments are concerned with the development of new processes, pilot plant studies and analytical research. Through the efforts of this group, Neville developed the country's first commercial process for the production of high purity Indene and Indene derivatives.

The Technical Service Department spends a large measure of its time in technical assistance to our customers. Whether their products are rubber goods, coatings, floor materials, adhesives or any other, Neville studies them for application with our products and for possible improvement. The people in Technical Service pride themselves on often solving problems before customers are aware of their existence.

Neville's thirteen completely new and modern laboratory units function alike for basic research, process development, technical service, laboratory service, and isolating new chemicals or polymers. The laboratories are arranged in a continuous double line with the advanced design pilot plant at the end. Thus, when new polymers have been discovered and studied, they subsequently proceed from one step to the next and continue down the hall to the pilot plant where the commercial feasibility of manufacture is established. In addition to this, the Quality Control Laboratories, which maintain separate quarters in the plant, are constantly at work checking to be certain that every Neville product will conform accurately to specifications.

Much of the benefit of Neville's new facilities could not be readily translated into customer profit were it not for the work of the technical representatives. These highly trained men act as liaison between your plant and the new Neville Island Center. You will find it pays to ask a member of this technical service staff to visit you and bring your formulation problem back to the laboratories for solution.



In the basic research department of Neville's new center, scientist takes a reading from a new Chromatograph to separate and determine chemical components. Not shown is an advanced new infra-red spectrophotometer for even closer identification.

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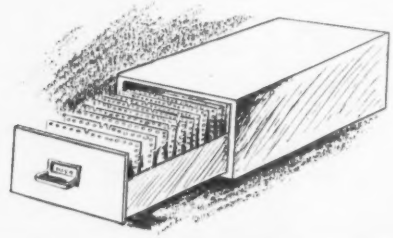

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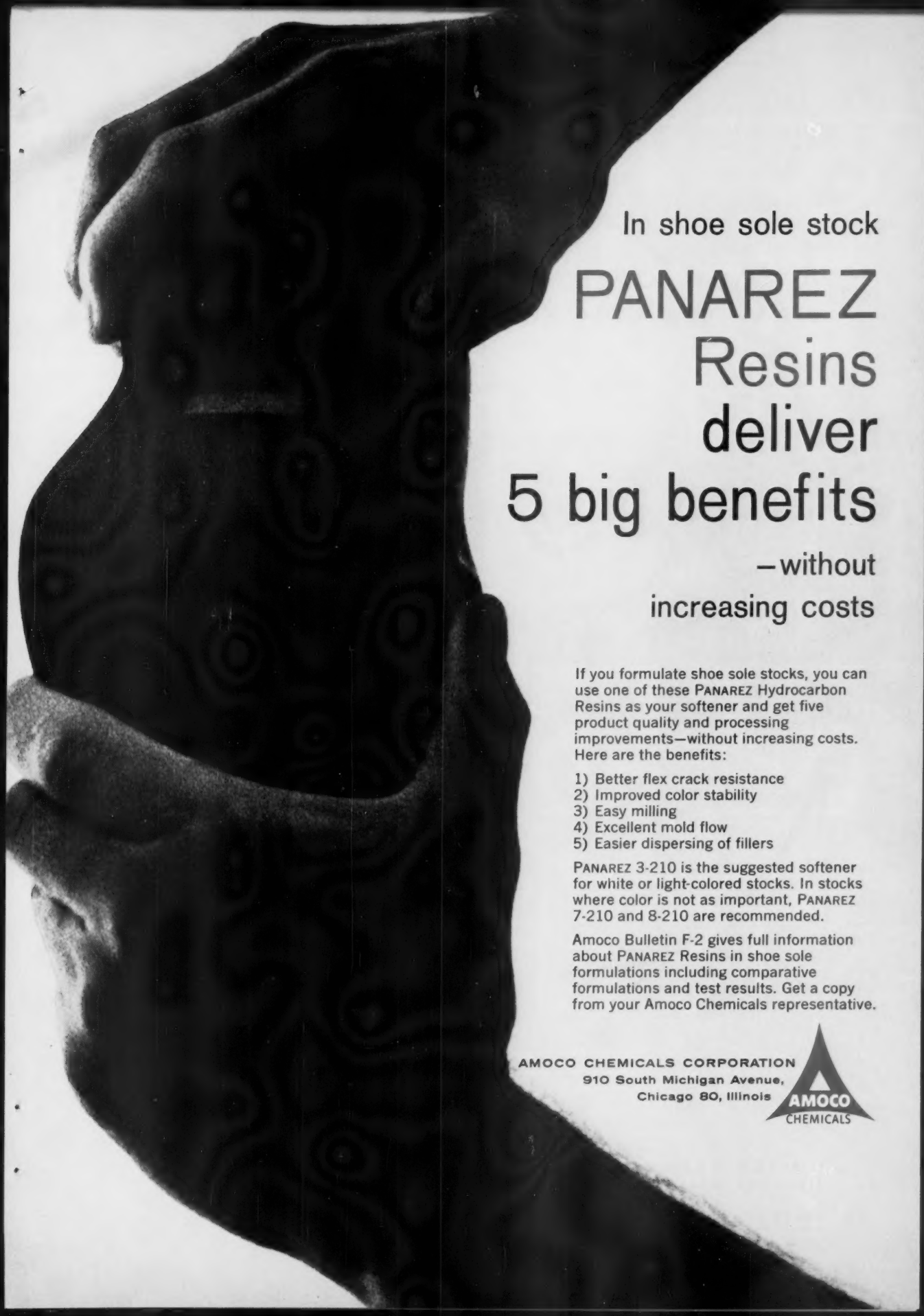

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Amoco Bulletin F-2 gives full information about PANAREZ Resins in shoe sole formulations including comparative formulations and test results. Get a copy from your Amoco Chemicals representative.

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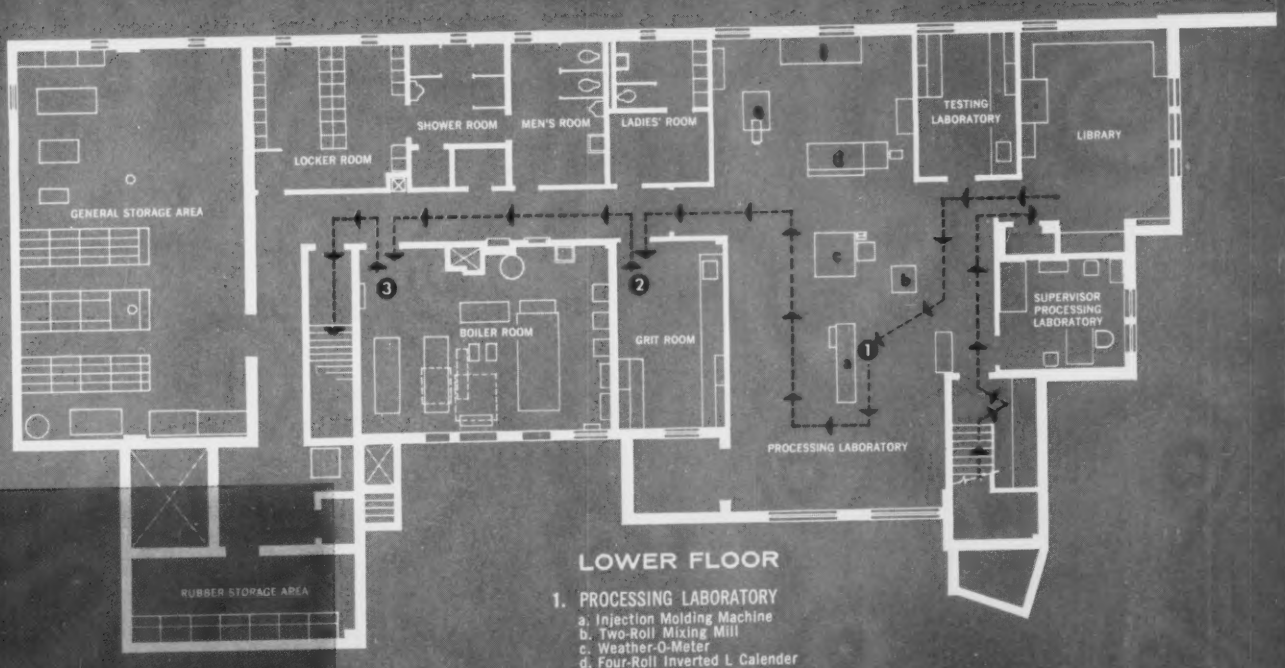

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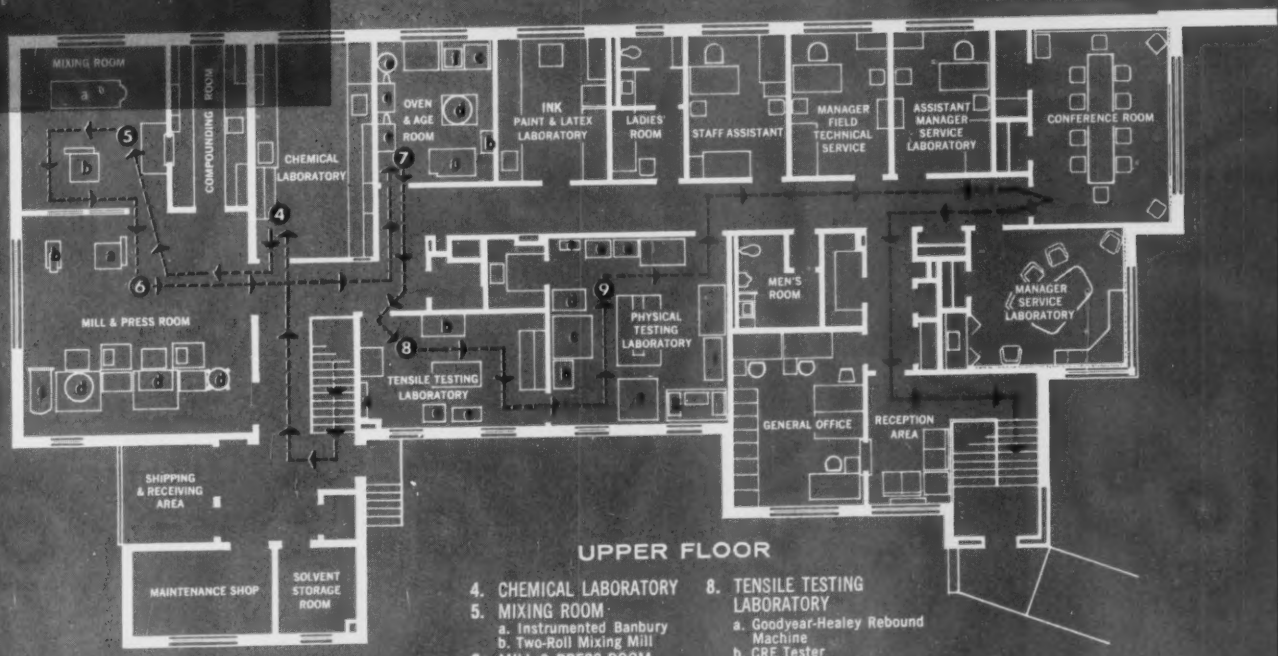

UPPER FLOOR

4. CHEMICAL LABORATORY
5. MIXING ROOM
   - a. Instrumented Banbury
   - b. Two-Roll Mixing Mill
6. MILL & PRESS ROOM
   - a. Two-Roll Mixing Mill
   - b. Extruder
   - c. Jacketed Vulcanizer
   - d. Compression Molding Presses
7. OVEN & AGE ROOM
   - a. Ozone Test Chamber
   - b. Oxygen Bomb
   - c. Convection Ovens
   - d. Fade-O-Meter
   - e. Test Tube Aging Cell Oven
   - f. Muffel Furnace
8. TENSILE TESTING LABORATORY
   - a. Goodyear-Healey Rebound Machine
   - b. CRE Tester
   - c. Constant Rate of Extension Testers
9. PHYSICAL TESTING LABORATORY
   - a. Goodyear Angle Abrader
   - b. Goodrich Flexometer
   - c. Firestone Flexometer
   - d. Extrusion Plastometer
   - e. Mooney Shearing Disc Viscometer
   - f. De Mattia Flexing Machine
   - g. Ross Flexing Machine

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Francis Shaw machine

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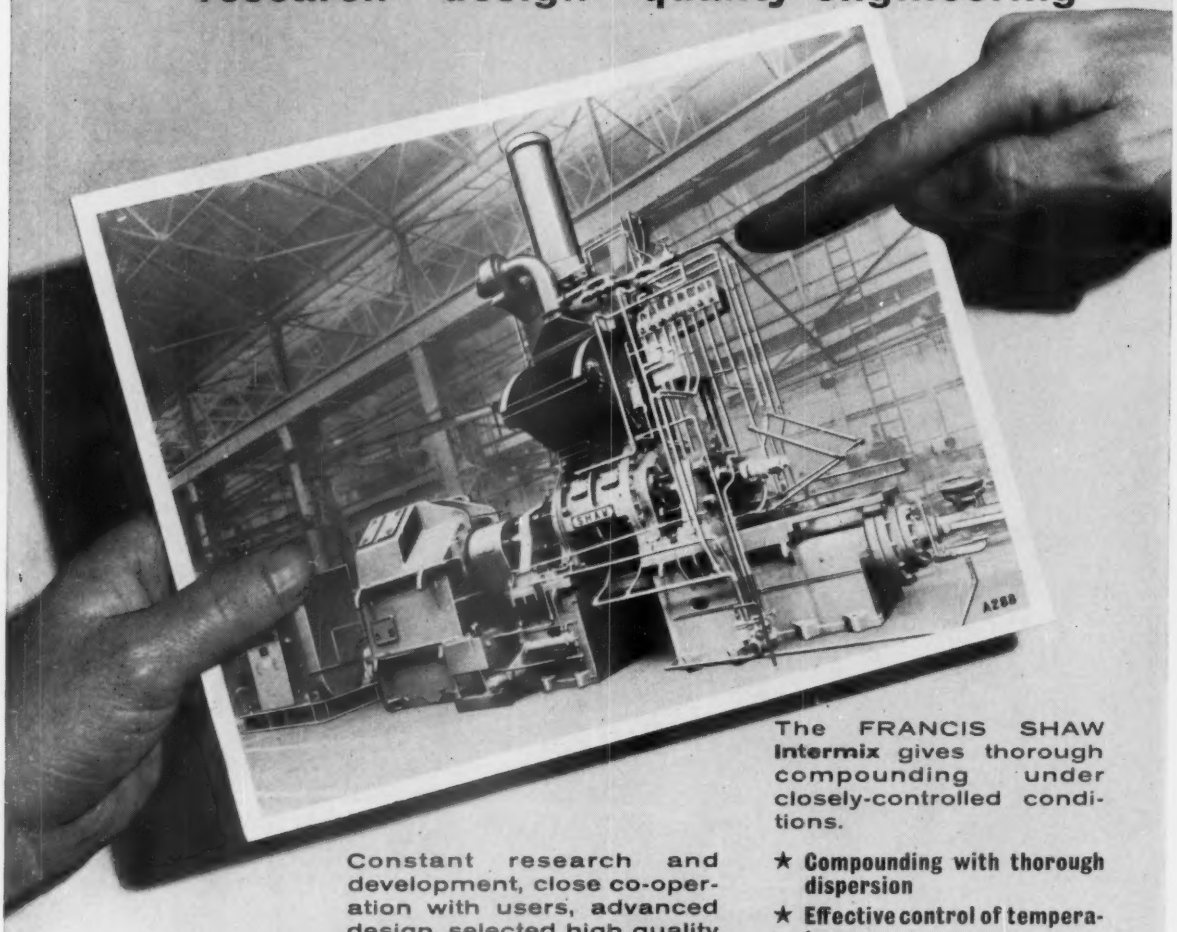

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OVERSEAS AGENTS THROUGHOUT THE WORLD P4378

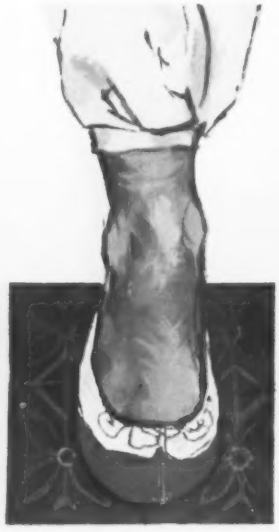
Some useful information for the men who shape the things we stand on...

18,000 B.C.—Mousterian man was self-shod, and gingerly trod a clay-and-gravel floor. His was a lifetime sort of footwear and the wearers had to be calloused customers.

800 B.C.—The soft leather shoe of ancient Persia gave excellent footing on floors of polished tile. The shoe looked like a small girl's pump, but the wearers were really tough warriors.

300 B.C.—Alexander and Archimedes wore simple sandals like these in the marbled halls of ancient Greece. It's a far cry from the spring and wear of a modern S-Polymer shoe sole.

800 A.D.—Cold steel on colder flagstone marked the medieval knight. No pussyfoot was he. With a built-in gong on either foot, no wonder his feats ring through the Ages.



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Modern man walks <u>on</u> and <u>in</u> products made from S-Polymers from Shell Chemical. They simplify processing; impart toughness, flexibility and long life.

S-1509

A low-viscosity cold rubber, S-1509 provides light color, outstanding physical properties and superior mold flow.

SP-103

A resin-rubber masterbatch, SP-103 offers similar advantages because the rubber hydrocarbon in SP-103 *is* S-1509. SP-103 is made from equal parts of S-1509 and high styrene resin for added abrasion resistance, gloss, stiffness and durability.

Light Color . . . Nonstaining and nondiscoloring S-1509 and SP-103 are excellent for white stocks because of their own inherent light color and also because they need no discoloring peptizing agents.

Low Viscosity . . . S-1509—by itself or in SP-103—has a viscosity range of 30-38; it needs no breakdown and comes to you ready for immediate processing even in sponge applications.

Outstanding Physical Properties . . . Properties of S-1509 stocks closely compare with those of plasticized high Mooney counterparts.

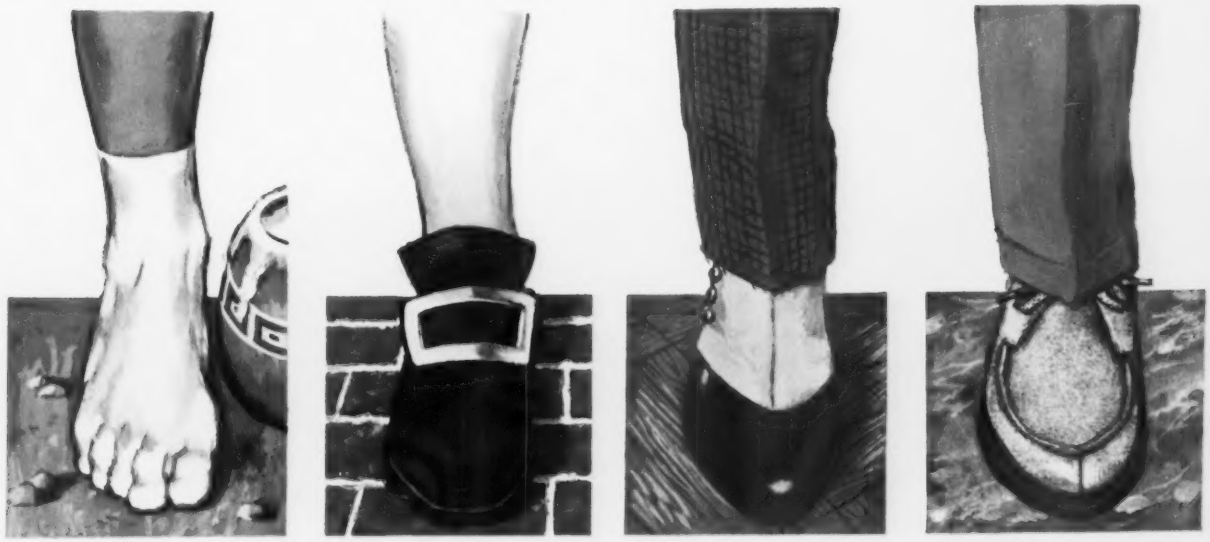
Superior Mold Flow . . . Stocks made with S-1509 and SP-103 provide sharp design

1300 A.D.—When the Mayan dandy wanted shoes he simply milked a rubber tree and used his foot for the mold. Use of *shoe soup* was free to all. The style was crude; the fit perfect.

1776 A.D.—Freedom of the feet came fast on the heels of tyranny with light, comfortable walking shoes and smooth, quick-drying brick walks. It was an era of advanced "understanding."

1890 A.D.—Patent leather shoes with spats on slick parquet floors marked a night out during the Gaslight Age. Elegance outweighed wear and corns were epidemic.

1960 A.D.—Ultimate in "footwork" is the comfortable shoe sole made with an S-Polymer. S-Polymers also give us handsome, long-wearing rubber tile, luxurious sponge rug underlay, and dozens of other products.



today's "footwork"

transfer from the most intricate mold to the finished product.

Reduced Mixing Time . . . Your in-plant mixing time is significantly reduced with SP-103 because the resin is added at the latex stage and is thoroughly dispersed.

Reduced Scorch . . . When you use SP-103 instead of mixing in clear resins yourself, there is less tendency to scorch because shorter mixing time is required, making possible lower mixing temperatures.

Convenience and Economy . . . SP-103 comes to you in free-flowing crumb form, minimizing loss of material and dust problems encountered with clear resins.

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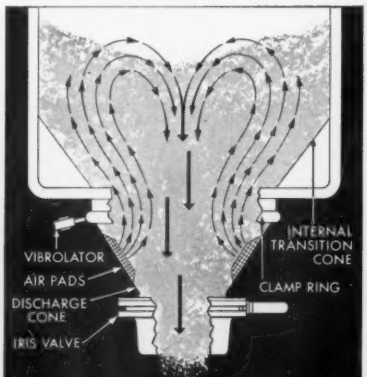

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3 NEW REGAL BLACKS

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New Regal blacks — made by an entirely new process* — will give you new ideas about what carbon black can do for rubber!

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— this new oil furnace black is recommended as a lower cost replacement for channel black in rubber applications. Provides rubber properties virtually identical with those of premium priced channel blacks, but with the faster curing rate of HAF types. Comparable with EPC black in modulus, elongation and tensile strength, Regal 300 has actually outperformed channel blacks in wear and tear resistance, cracking and chipping, in passenger car tire and truck tire road tests. Recommended for highway, off-the-road truck and passenger car tire treads, and tread rubber, where service calls for typical channel black resistance to tearing, cutting and chipping.

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— this is a totally new type of oil furnace black for passenger car tire treads and tread rubber, which combines low hardness and low modulus (for quieter ride and better traction), with the excellent tread wear resistance of an ISAF black. It out-performs ISAF black in cold SBR, oil-extended SBR and natural rubber by delivering higher tensile strength and elongation, lower modulus and hardness, and lower heat generation.

REGAL® SRF

— this is the first semi-reinforcing black to be made from oil. Performance matches and in some cases excels conventional gas-produced SRF black. Interchangeable with gas-produced SRF, Regal SRF has the same physical properties and processing characteristics — equivalent modulus, hardness, tensile strength, elongation, tear resistance, resilience and compression set — in natural rubber, SBR, butyl, neoprene and nitrile rubber.

*These 3 new Regal blacks, developed by Cabot research and produced by a new, exclusive manufacturing process from oil, are now in commercial production and available world-wide — another step in Cabot's long range program to meet threatened gas shortages and rising natural gas prices.

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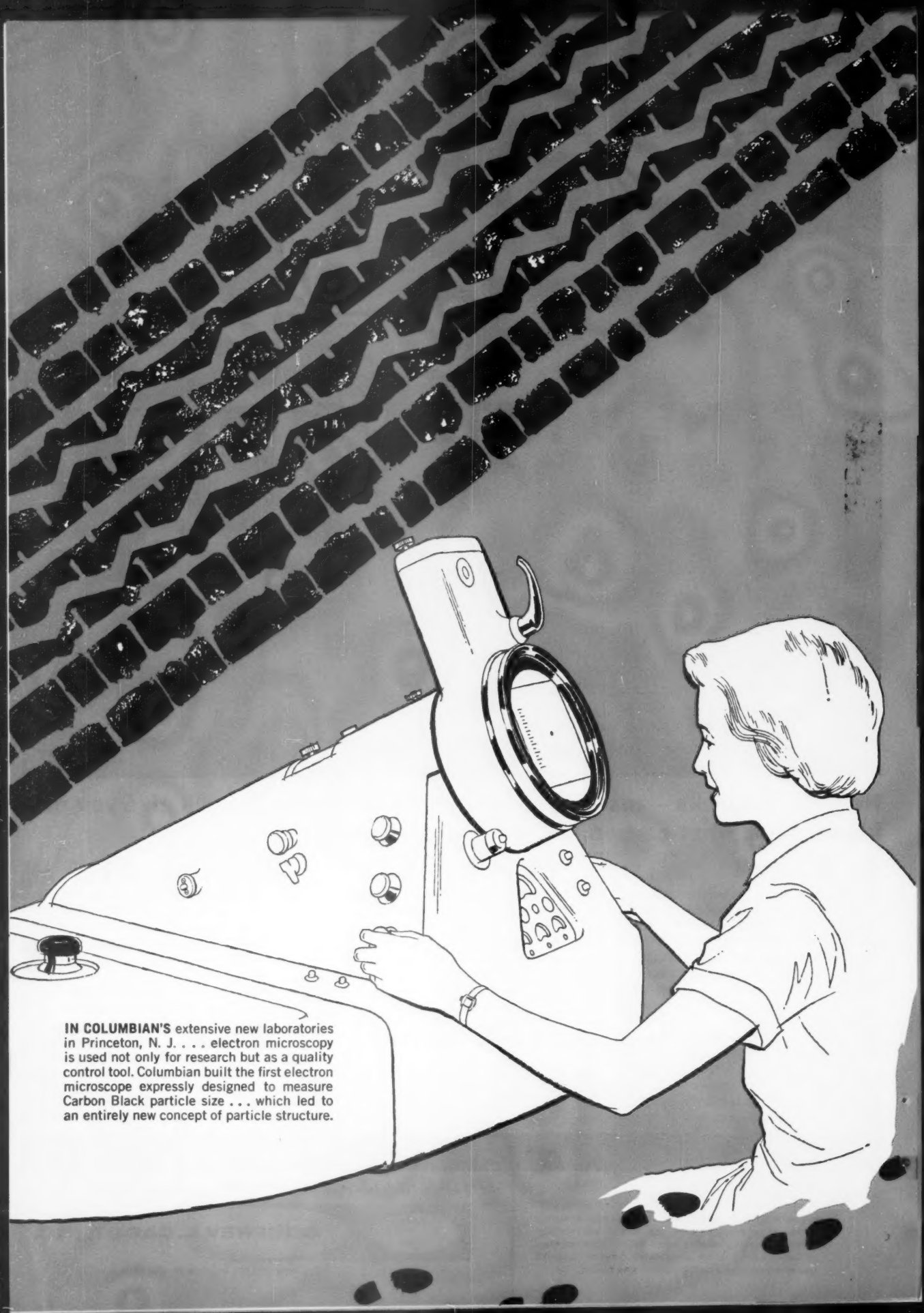

IN COLUMBIAN'S extensive new laboratories in Princeton, N. J. . . . electron microscopy is used not only for research but as a quality control tool. Columbian built the first electron microscope expressly designed to measure Carbon Black particle size . . . which led to an entirely new concept of particle structure.

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STATEX R AND STATEX 125 NOW AVAILABLE FOR SHIPMENT
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Many major contributions have come from Columbian research. In the quest for blacks that meet the most exacting requirements . . . Columbian was first to discover the part pH plays in curing characteristics... first in the industry to utilize the electron microscope for measuring the size of particles... first to create beaded blacks... first to develop a Black Rubber process which changed quality minuses to quality pluses. Every first is another reason for specifying Columbian... get the full story... now!

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STATEX® 160 Super Abrasion Furnace **SAF**
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CARD-O-TIMER*

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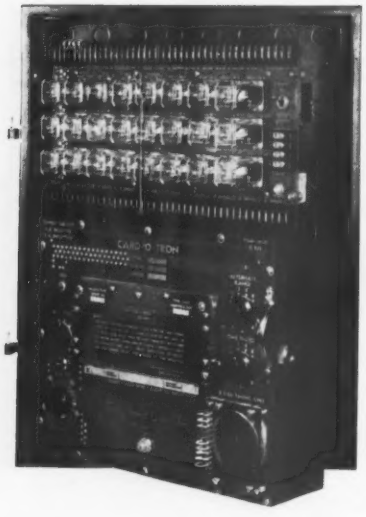

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With this remarkable new instrument you—

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CARD-O-TIMER Controller is a product of Taylor-Emmett Controls, Inc., Akron, Ohio, a subsidiary of Taylor Instrument Companies. Call your Taylor Field Engineer for full information, or write for **Bulletin 98357.** Taylor Instrument Companies, Rochester, N.Y., and Toronto, Ont.

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News in Brief

► Naugatuck Chemical, Naugatuck, Conn. division of U.S. Rubber Co., is offering two new technical bulletins. One, Bulletin C-101, on Celogen-Az, a nitrogen blowing agent, gives data for expanding polyethylene, polypropylene, calendered and plastisol vinyl foams. The other, on Celogen, also a nitrogen blowing agent, gives data for expanded polyethylene and polyvinyl chloride.

► An eight-page illustrated bulletin, a 1960 guide to the company's complete line of silicone products, can be obtained from the Silicone Products Department of General Electric, Waterford, N. Y. Ask for CDS-129B.

► Hi-Sil Bulletin No. 19, made available by the Columbia-Southern Chemical Corp., deals with "Water Absorption Characteristics of Non-Black Reinforcing Fillers." It presents a comparison of Hi-Sil 233 with a commercially available sodium silico aluminate in a variety of compounds based on both natural and synthetic rubbers.

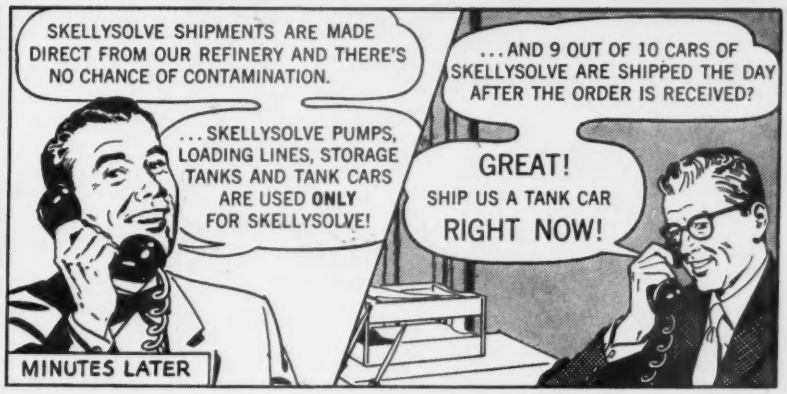
► "Sulphur Group Analysis in Natural Rubber Vulcanizates," a booklet made available by the Phillips Chemical Co., Akron, Ohio, reviews and analyzes methods which have provided insight into the chemical nature of the cross-links in vulcanized rubber.

► Bulletin 121 of a continuing series made available by the Butyl Division of Enjay Company, Inc., New York, N.Y., is entitled "Sulfur-Donor and Low Sulfur—High Accelerator Cures." The pamphlet discusses advantages and applications of sulfur-donor and low sulfur cures of butyl vulcanizates, outlining tests conducted by the company.

► Bulletin 651 of the Butyl Division of the Enjay Company, Inc., New York, N.Y., "Construction and Performance of Butyl Tires," presents recent data and theories on why all-butyl tires perform as they do.

► McKesson and Robbins, Inc., New York, N.Y., has been appointed a national distributor of the styrene monomer produced in drum quantities by Monsanto Chemical Co., Springfield, Mass.

The Case of The
LUCKY LAWSUIT
IS SOMETHING WRONG, MR. SMITH?
PLENTY! SOME OF THE SOLVENTS I'VE BEEN BUYING HAVE BEEN CONTAMINATED! IF THIS KEEPS UP, WE MAY BE SUED!
I WONDER IF THE PROBLEM COULD BE THAT THE SOLVENT DID NOT COME DIRECT FROM THE REFINERY.
PURCHASING AGENT


SKELLYSOLVE SHIPMENTS ARE MADE DIRECT FROM OUR REFINERY AND THERE'S NO CHANCE OF CONTAMINATION.
...SKELLYSOLVE PUMPS, LOADING LINES, STORAGE TANKS AND TANK CARS ARE USED ONLY FOR SKELLYSOLVE!
...AND 9 OUT OF 10 CARS OF SKELLYSOLVE ARE SHIPPED THE DAY AFTER THE ORDER IS RECEIVED?
GREAT! SHIP US A TANK CAR RIGHT NOW!
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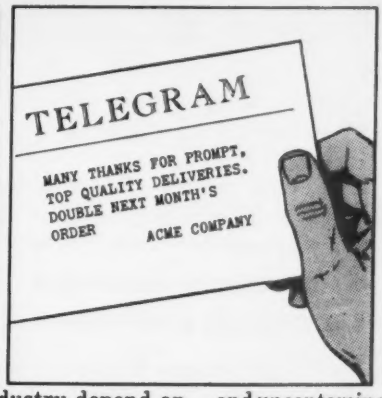

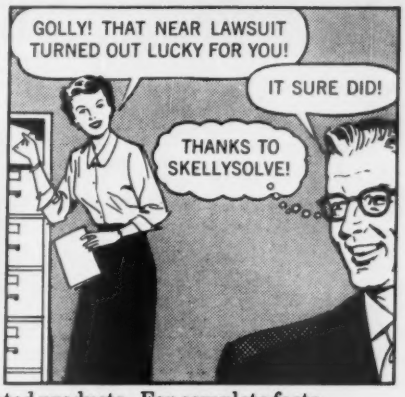

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SKELLYSOLVE-B. For making quick-setting cements for the shoe, tape, container, tire and other industries. Quick-drying, with no foreign taste or odor, in dried compound. Closed cup flash point about -25° F.

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SKELLYSOLVE-L. For general manufacturing operations where a medium evaporation rate is required. Closed cup flash point about 12° F.

SKELLYSOLVE-R. For general use in tire building and a variety of other manufacturing operations and cements. Reduces evaporation losses. Medium quick final dry. Lessens bloating and skinning tendency. Closed cup flash point about -25° F.

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Division of United States Rubber Company 611-N Elm Street Naugatuck, Connecticut

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Naugatuck PARACRIL OZO

THE OIL-RESISTANT, OZONE-RESISTANT NITRILE RUBBER

Great new advance in hose rubber

New PARACRIL OZO—exciting development from the laboratories of Naugatuck Chemical—offers the makers and users of rubber hose a combination of properties never before available.

Hose of every description, for practically every purpose, can be tougher, less bothered by abrasion, more oil and weather resistant than ever before. *And it can be produced in any permanent color desired!*

New PARACRIL OZO offers such advantages as:

- significantly superior ozone resistance
- excellent fuel and oil resistance
- several times greater abrasion resistance
- permanent retention of bright, uniform colors

Discover first hand the dramatic new sales possibilities this proven new rubber offers you. In increased product quality. In new production economy. For full information and whatever technical assistance you may require, contact your Naugatuck representative or write the address below today.

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Division of United States Rubber Company Dept. A Elm Street Naugatuck, Connecticut

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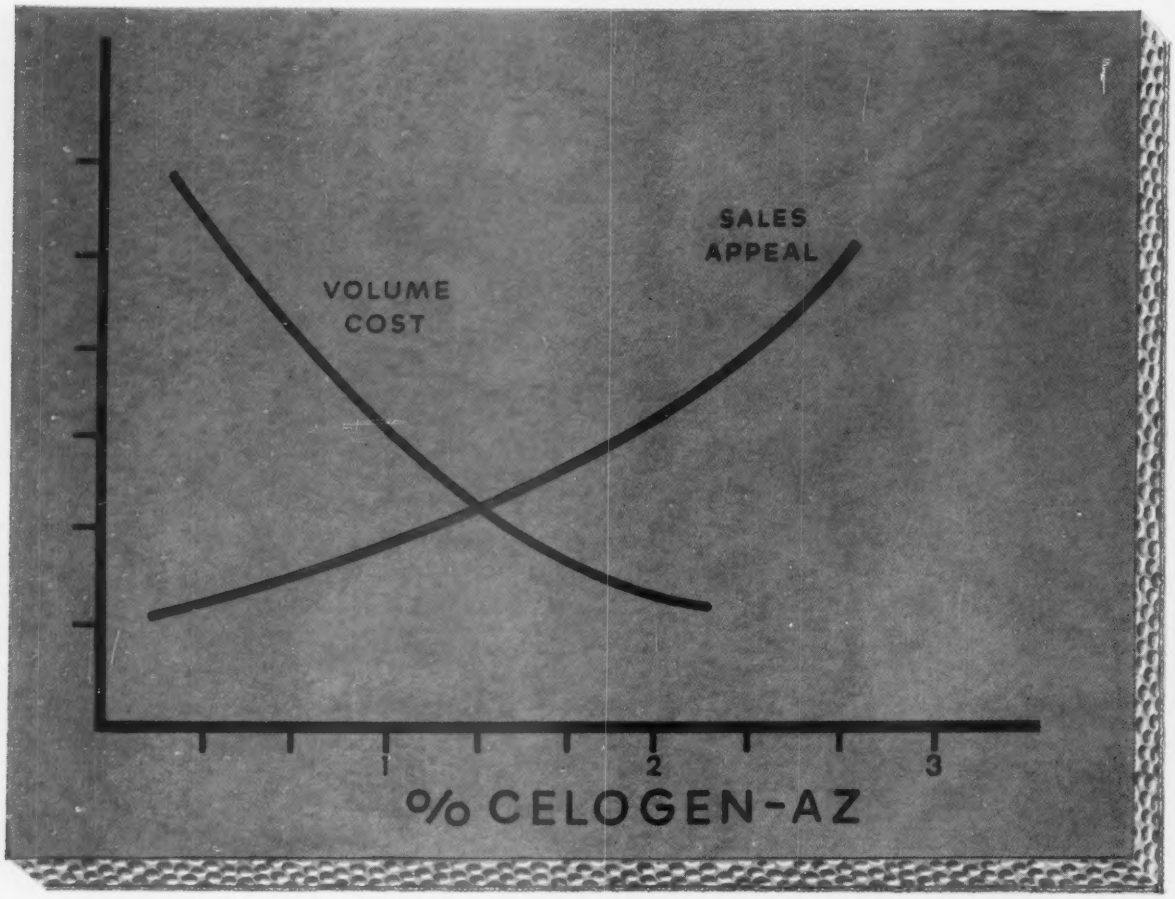

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Vinyls blown with CELOGEN-AZ have greatly increased resilience, a cushioning effect that is ideal for products ranging from table covers to floor tile. CELOGEN-AZ blown vinyls insulate better electrically and help deaden sound. They can be given a wide range of buoyancy.

Most important, CELOGEN-AZ produces no undesirable side effects, no unpleasant odors. The rubber industry proved it. It offers entirely new product-selling opportunities to *you*.

Discover the advantages of CELOGEN-AZ in your own vinyl or other plastics products. Contact your nearest Naugatuck Representative or the address below.

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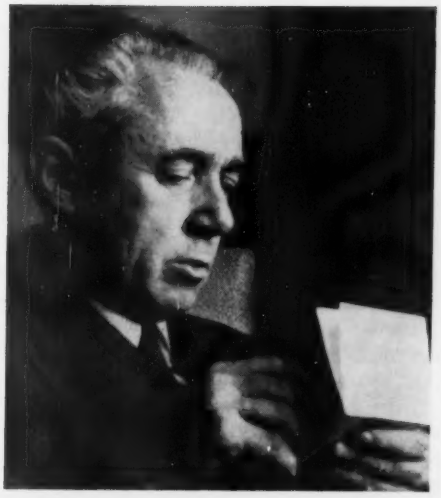
Elastomeric Properties of ETHYLENE-PROPYLENE COPOLYMERS

By Giulio NATTA and Giovanni CRESPI

Montecatini Societa Generale
Milan, Italy



DR. GIULIO NATTA

Whose Pioneering Research on Surface Catalysts Helped To Revolutionize Polymer Chemistry, Opening Prospects for the Detailed Control of Molecular Structure and the First Exact Synthetic Copies of Natural Materials. At present: Director of Industrial Chemistry Institute, Milan Polytechnic, Italy.

THE PROBLEM of obtaining synthetically saturated, linear hydrocarbon macromolecules, having elastomeric properties (in the absence of reinforcing additives) comparable to those of natural rubber, and better chemical resistance, has been solved in a more or less satisfactory manner only regarding the phenomenology of slow elastic elongations under small stress, but is far from resolved in respect to dynamic properties. What differentiates natural rubber from all other pure elastomers is its high synergistic response to rapid deformation and, in many cases, also its high tensile strength with high elastic modulus at high elongations.

The exceptional elastic properties of natural rubber are generally attributed to the great length and exceptional flexibility of its linear macromolecules which is related to the peculiar structure of the polyisoprene chain with *cis*-1,4 linkage, and especially to the little-hindered rotation of single bonds of the chain which are adjacent to a double bond. The ease of rotation of segments of the chain around such bonds makes natural rubber in the unstretched state comparable, from some points of view, to a true liquid without associative forces between the separate molecules, and one which has a very high viscosity. It has, even in its unvulcanized state, the exceptional property that viscous creep resulting from sudden and large stresses can be impeded by the orientation of the molecules, which have a high degree of regularity in their steric structure, and by resulting crystallization induced only by the application of such rapid mechanical stresses.

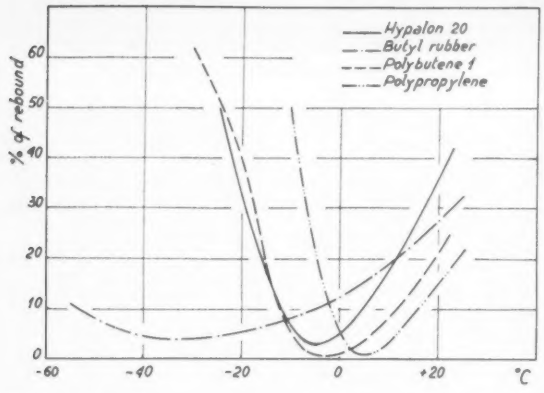


FIG. 1—Rebound curves as a function of temperature for various saturated elastomers.

Properties peculiar to natural rubber — not fully reproduced by other types of macromolecules—are its great tendency to act like a liquid and, at the same time, its capacity to crystallize if the macromolecules become parallel by the application of mechanical stress, resulting in low elastic modulus under low stresses and high elastic modulus under high stresses. This explains why in over 50 years of research, the greatest efforts to produce synthetic rubbers having properties close to those of natural rubber have been directed toward the polymerization of diolefins in an effort to reproduce the structure of natural rubber.

Recent Polymerization Breakthrough

The results obtained have not, however, completely resolved the problem, and qualities of the best currently available diolefin synthetic rubbers (Buna S, styrene rubber, etc.) correspond only partially to the desired properties. Rebound properties and tensile strength, in the absence of reinforcing additives, have not been satisfactory. These deficiencies were due to irregularities, either in the type of linkage of the monomeric units which reduced the flexibility of the chain, or to steric irregularities in the units having the same linkage. Only recently, by stereospecific polymerization processes, have isoprene polymers been obtained with a *cis*-1,4 chain structure *(1-4)* which reproduces closely that of natural rubber. However, *cis*-1,4 butadiene polymers *(5-6)* have been made with elastic properties similar or even superior to natural rubber in the low-temperature field.

At the time these fundamental discoveries in the field of diolefin polymers were made, no less important results (which can be called unexpected in rubber industry circles) were obtained in the field of polyhydrocarbon rubbers, based on alpha-olefins made up completely or chiefly of saturated monomeric units. Compared to polydiolefins, these rubbers have greater stability when exposed to atmospheric agents, and greater resistance to aging. Furthermore, they are obtained from low-cost monomeric raw materials. Research carried out in order to obtain linear macromolecules with a high degree of flexibility, practically free from polar groups, has been successful.

Previously known elastomers, made up completely or extensively of saturated polyhydrocarbons, are polyisobutylene and its copolymers which contain a high percentage of isobutylene (butyl rubber). At room temperature, they have high elastic elongation that is slowly reversible, since the rapid deformation cycles are accompanied by large absorption of mechanical energy through hysteresis. Such rubbers, even though they have improved elastic properties at high temperatures, differ significantly from natural rubber at low temperatures. Their slight permeability to gases, significantly lower than that of natural rubber, has nevertheless permitted their wide application to certain specialized fields.

Efforts to produce rubbers from more flexible chains, such as the polyethylene chain, ran into difficulties because of the high crystallinity of linear polyethylene. Attempts were made to surmount these difficulties by creating irregularities in the chains; for example, by chlorination or by sulfo-chlorination. However, to destroy the crystallinity of polyethylene, a high chlorine content is necessary: about 28 to 30 per cent. Rubber obtained in this manner (e.g., Dupont's Hypalon), while having elastic properties for slow deformations, because of its high chlorine content, also exhibited high density, lower flexibility, and a tendency toward association between polar groups of different chains. This resulted in worsening of its dynamic properties.

New processes of coordinated anionic catalysis, using heterogeneous catalysts with microcrystalline supports, have made it possible to obtain isotactic polymers from alpha-olefins. These had a regular structure and were, therefore, crystallizable. The same processes made it possible, as well, to obtain amorphous, atactic, linear polymers, by using special amorphous catalysts. Such polymers have elastomeric properties which, at room temperature, are no better than those of polyisobutylene, in spite of the minor steric hindrance to rotation presented by the single, lateral, methyl group per monomeric unit (instead of the two methyl groups in polyisobutylene), because of higher, second-order transition temperature (Figure 1). Moreover, the dynamic properties of the elastomers obtained from such polymers were not yet entirely satisfactory, and their tensile strength was rather low without reinforcing agents.

There was then programmed at the Milan Polytechnic Institute a study of the synthesis of polyolefinic macromolecules, containing a chain chiefly made up of polyethylene (poor in side groups), to give high flexibility to the chain. Their crystallinity (at least in the unstretched state) should be hindered by the statistical substitution of hydrogen atoms with substantially non-polar groups, in order to produce associative forces between different chains. This research has now led to the synthesis of copolymers (ethylene-propylene, ethylene-butylene, etc.) which have proved to have extremely interesting elastic properties, as well as good dynamic properties (low

hysteresis). The process for the synthesis of such polymers has been described in other papers *(7-14)*. In this article, we shall describe their elastomeric properties in more detail.

Characteristics of the Polyethylene Chain

It is known that the free molecule of linear polyethylene has a high flexibility, due to the relatively limited energy barrier which opposes rotation of its CH_2-CH_2 bond. The molecule is characterized by the ease with which different conformations can coexist because of the small energy difference between them. Research carried out by Flory on the elastomeric properties of the polyethylene chain has shown that this difference is about 450 cal/mole—significantly lower than that of other olefin chains, particularly polyisobutylene's. However, Flory's research *(15)* was carried out at high temperatures where the crystallinity disappears.

Most of the research on the elasticity of rubbers has, in fact, been based on a description of models of free chains, whose average length can be predicted by certain statistical calculations. It can be postulated, for example, that every CH_2-CH_2 bond is free to assume any of three positions 120 degrees apart, corresponding to the positions of least potential energy. Such statistical conformations of the chains should be modified by forces causing elongation of the chains themselves, which thereby tend to assume a more linear configuration and become parallel. The low modulus observed under small deformations, even for some chains in which rotation of the C-C bonds is hindered by quite high energy barriers, could ultimately be traced to the further effect of chain flexibility.

A remarkable flexibility in the long chain of a perfectly linear polyethylene can exhibit itself with rotations of the CH_2-CH_2 bond, much smaller than that necessary to overcome the energy barrier which corresponds to a rotation of 60 degrees. Beyond this, there is a tendency to pass over from the planar trans (zig-zag) configuration to a left-handed one.

A Note on Terminology

For readers to whom Dr. Natta's work may be new, we quote the following illuminating passage from Herbert R. Simonds' "Source Book of the New Plastics" (Reinhold Publishing Corp., New York, N. Y.):

"Professor Natta found it necessary to coin a series of words that have now become widely known, if not so widely understood. These words are applicable to any polymer formed by polymerization of a monomer containing an ethylene group which has a chain or substituent on one carbon of the ethylene group. Propylene is the simplest such monomer, having a methyl group on one carbon of its ethylene group.

"Professor Natta discovered catalysts which had the property of directing the growth of the polymer from such a monomer so that the substituent would always appear in the same relative position to the chain. Such catalysts are called **"stereospecific,"** and the polymer produced is called **"isotactic."** The term **"syndiotactic"** is used to describe other arrangements of the polymer where the substituent regularly alternates in two positions, and the term **"atactic"** is used where the substituent falls into its possible locations at random.

"The important configuration as it relates to polypropylene is isotactic. Isotactic polypropylene is harder, stronger, stiffer, and has greater temperature resistance than polypropylene that is atactic . . . It combines the excellent electrical properties, moisture resistance, and dimensional stability of the pure hydrocarbon plastics (polyethylene and styrene) with strength, toughness and heat resistance."

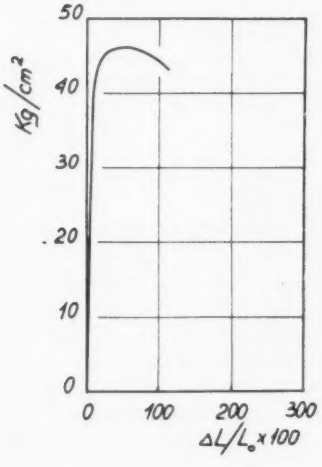
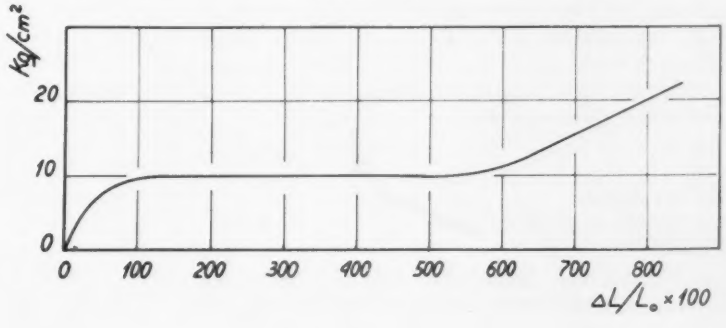


FIG. 2—Stress-elongation diagram for a 50:50 mechanical mixture by weight of linear polyethylene (MW 90,000) and atactic polypropylene (MW 70,000).

FIG. 3—Stress-elongation diagram for an ethylene-propylene copolymer having a molecular weight of 460,000 and containing 50 mole percent ethylene (test velocity 50 mm/minute).



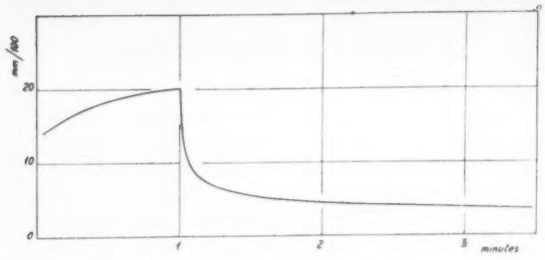


FIG. 4—Depth of indentation of the sphere of the durometer as a function of load application time (1 minute) and recovery from the deformation when the load is removed (diameter of the ball: 0.4 mm load applied: 15.7 g).

Independently of this, it should be remembered that, in the free polyethylene chain, all the C-C bonds have an equal if not greater flexibility, while in the polyisoprene *cis*-1,4 molecule only the $=CH-CH_2$ bond has greater flexibility.

What has been said above, refers to the free linear polyethylene molecule without long branches. At temperatures lower than 137° C. however, linear polyethylene shows a great tendency to crystallize. If the chain is not subjected to special modifications which hinder its crystallization, this tendency precludes the appearance of elastomeric properties. Corresponding to the great variation in specific volume during crystallization, a high lattice energy forces the chains to become parallel and rigid in spite of their intrinsic flexibility.

Keeping Transition Temperature Low

Leaving aside the difficulty of high crystallinity which, as we shall see, can be eliminated by proper statistical introduction of substituents, there is another extremely important property of the polyethylene chain—its exceptionally low, second-order transition temperature. Modifications of the chain should, therefore, be made with substituents which bring about a large reduction in crystallization temperature (up to its complete disappearance), but which raise the second-order transition temperature minimally.

The statistical replacement of hydrogen atoms by various substituents can be compared to the copolymerization of ethylene with ethylenic monomers containing such substituents. A statistical copolymerization of non-isomorphous, monomeric units leads to a lowering of the melting temperature which can be calculated by Flory's expression *(16)*, while the transition temperature generally assumes values intermediate between those for the single homopolymers.

Following these results, we compared the second-order transition temperatures of homopolymers:

	Transition Temperature (°C.)	
	Dilatometric	Dynamic
Polyvinyl chloride	77	110
Polypropylene	—33	+4
Polybutylene	—43	—5

Our research was carried out with the aim of destroying the crystallinity of the polyethylene chain, at the same time trying to raise the second-order transition temperature as little as possible. We did this by copolymerizing ethylene with other linear alpha-olefins, for example propylene or butylene.

Viscosity of Marketable Polymers

The ethylene-propylene copolymer, as it is now being made by the Montecatini Company, is normally in the form of rubbery flakes which agglomerate easily. On a roll mixer, the copolymer forms a very strong, rough band which is not noticeably plasticized even after long periods of mixing. By compression molding, sheets which have a low surface hardness and excellent flexibility, down to very low temperatures, can be easily obtained.

At normal temperatures, the behavior of ethylene-propylene copolymers, under the action of external forces (relaxation of the stress at constant elongation, creep under the action of a constant load), is completely analogous to that of the other elastomers, such as polyisobutylene, unvulcanized natural rubber, etc. This is distinctly different from the visco-elastic behavior of mechanical mixtures of the two homopolymers. In fact, these mixtures generally exhibit great intermolecular cohesion, essentially due to the presence of crystalline parts. The initial elastic modulus of such mixtures is fairly high, as can be easily seen by subjecting a sample of this material to tensile tests (see Figure 2).

The difference in visco-elastic behavior between the mechanical mixtures and the copolymer is very evident, if Figure 2 is compared with the stress-elongation diagram for copolymers containing about 50 mole per cent ethylene (Figure 3) and having a high molecular weight ($[\eta] > 4 \div 5$). From this diagram, it can be seen that low values apply to the initial elastic modulus, but high ones to deformation at rupture. The deformation is generally reversible, according to the mechanism of delayed configurational elasticity.

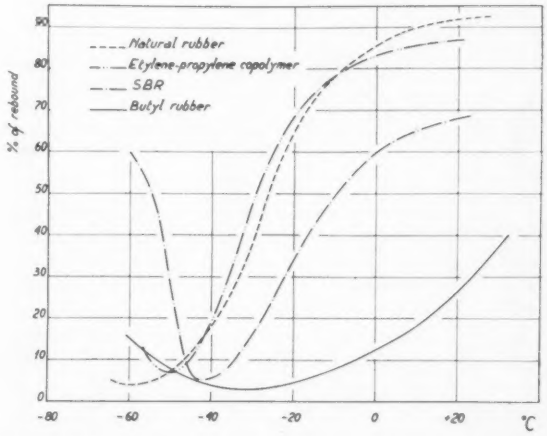


FIG. 5—Rebound curves as a function of temperature of various elastomers, compared with an ethylene-propylene copolymer containing about 70 mole percent ethylene (MW 360,000).

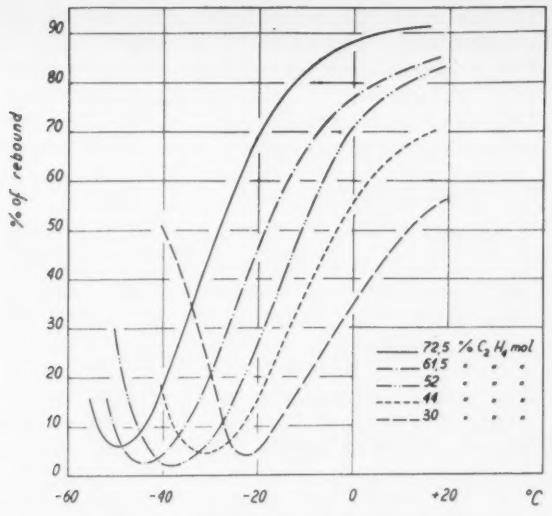


FIG. 6—Rebound curves as a function of temperature for ethylene-propylene copolymers having various ethylene contents, with molecular weights between 200,000 and 450,000.

The elastic modulus can also be measured by recording the depth of indentation of the sphere of a durometer, under a known weight, following the usual methods for the measurement of hardness. This depth of indentation, in the case of an ethylene-propylene copolymer, is a continuous function, increasing with the time of application of the load. Therefore, elastic modulus, calculated by Scott's formula *(17)* becomes equal to

$$G = \frac{P}{0.00051.R^{0.65} \quad H^{1.35}}$$

(where G is the modulus in kg/cm², P the load applied to the sphere in kg, R the radius of the sphere in cm, H the depth of indentation by the sphere in hundredths of mm)

and should be referred to a constant-load, application time. Making a measurement after 3 seconds of load application, the ethylene-propylene copolymers have, on the average, a modulus between 8 and 14 kg/cm², thus confirming the low values of intermolecular cohesion forces. Curves for indentation depth and deformation recovery are shown in Figure 4.

Obtaining Maximum Elasticity

A property of elastomers which is very important from a practical point of view is their ability to absorb and to give up their deformation energy in a short period of time. In fact, a rubber which exhibits low hysteresis during a slow deformation is not necessarily a good elastomer if subjected to rapid deformation. In practice one of the most widely used methods for measuring the energy given up by an elastomer after a rapid deformation, is the measurement of impact resilience, usually defined as the percentage of rebound height of a pendulum which falls from a predetermined height. The numerical value of the resilience for the same elastomer may vary from one type of instrument to another, according to the characteristics of the instrument itself.

We measured the elastic response of the copolymer with a Pirelli instrument which consists essentially of a pendulum-type "rebound" apparatus, with a mass of 80 grams and an impact velocity of 5 cm/sec. The measurements were made at controlled temperature *(18)*. The rebound properties depend on the ability of the elastomer to reach equilibrium rapidly under given deformation conditions; thus, on the flexibility of the polymer chain in question. Above the second-order transition temperature, as temperature increases, flexibility of the macromolecules and, consequently, the percentage of rebound also increases.

In ethylene-propylene copolymers, sections consisting of macromolecules which are quite flexible (due to sequences of methylenic groups) are present. The flexibility of these chain sections remains quite high, even at much lower than room temperatures. It follows that the ethylene-propylene copolymers have good flexibility and, therefore, very good elastic properties. Figure 5 shows the rebound curve, as a function of temperature, of an ethylene-propylene copolymer compared with various elastomers. The behavior of the copolymer is better than that of butadiene-styrene rubber, and very close to that of natural rubber. The minimum rebound temperature is found for copolymers containing more than 45 per cent ethylene, at temperatures lower than —40° C., which permits the use of the copolymer as an elastic rubber, even at temperatures considerably lower than 0° C.

The flexibility of the chains depends essentially on the sequences of methylenic groups, as can be demonstrated by varying the composition of the copolymer. An increase of the ethylene content in the copolymer increases the length of such sequences as well as their number. Rebound curves, as a function of temperature, for various ethylene contents (Figure 6) show that the flexibility of the chain is better in the case of high ethylene content. The temperature at

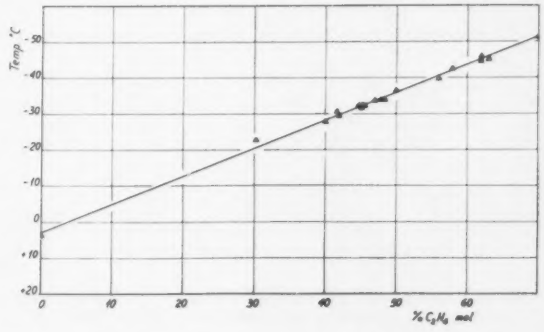


FIG. 7—Minimum rebound temperature of ethylene-propylene copolymers as a function of ethylene content.

which the resilience is at a minimum (for a frequency on the order of 100 Hz) is shown in Figure 7. This temperature depends on the transition temperature that is greater for copolymers in which higher proportions of the component with a higher transition temperature are present. The position and the absolute value of the minimum confirm what had been predicted: that is, that the polyethylene chain is, theoretically, well suitable for production of good elastomers.

Relating Physical Properties to Cross-Linking

The physical properties of cross-linked ethylene-propylene copolymers have been determined by use of various cross-linking agents. In studying the dependence of such properties on the density of reticulation, it was found particularly useful to employ as vulcanizers some organic peroxides, such as, for example, Dicup 40C *(19)*. The density of reticulation was determined by measuring modulus, at equilibrium, of samples treated with solvents *(20-22)*, based on known relations predicted by the statistical theory of rubber elasticity.

The diagram in Figure 8 shows the density of reticulation (expressed as the number of effective chains of cross-linked polymer per cm^3) as a function of the quantity of peroxide employed. The curve traced in this diagram represents the number of effective chains per cm^3 of cross-linked polymer which would have been formed if every molecule of peroxide had given rise to a transverse bond (corresponding to two effective chains). This curve was drawn without taking into account the possible degradation of the polymer which might be brought about by vulcanization.

A moderately good agreement can be noted between the experimental curves and the straight line drawn on the basis of peroxide content. At high peroxide levels, the experimental curve tends to decrease in slope. The reason for this greater consumption of peroxide, per transverse bond formed, is not yet completely clear. However, this is a phenomenon frequently noted in processes involving chemical radicals. The volume swelling ratio, at equilibrium, of such vulcanized polymers ($Q_m = \frac{1}{v_r}$), determined in benzene at 25° C. as a function of cross-linking, is shown in Figure 9. In this diagram, the density of cross-linking can be determined directly from the swelling data. Such a diagram has been shown valid also for copolymers cross-linked by different systems, where vulcanization has no noticeable influence on the constant characteristics of the polymer-solvent system. The interaction constants for ethylene-propylene copolymers in benzene at 25° C. were found to be $\mu = 0.48$ and $\beta = 0.29$.

Conclusions and Prospects

The synthesis of almost completely saturated, linear polyhydrocarbons, having good elastomeric properties, is made possible by the copolymerization of ethylene with aliphatic alpha-olefins. In particular, research on ethylene-propylene copolymers shows that many elastomers have dynamic properties which improve as the percentage of ethylene in the copolymer is increased. The minimum rebound temperature is very close to that of natural rubber and less than that of styrene rubber, if no sequences of monomeric ethylene units are present which are too long and, therefore, capable of crystallizing in a manner that can be determined by X-ray tests.

Ethylene-propylene copolymers cross-linked with organic peroxides are seen to follow faithfully the predictions of the statistical theory of rubber elasticity. The number of transverse bonds per small

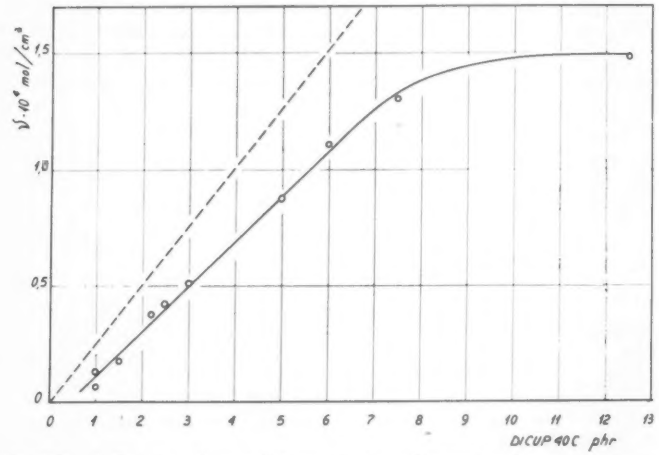


FIG. 8—Density of cross-linking of the ethylene-propylene copolymer, vulcanized with various quantities of Dicup 40C.

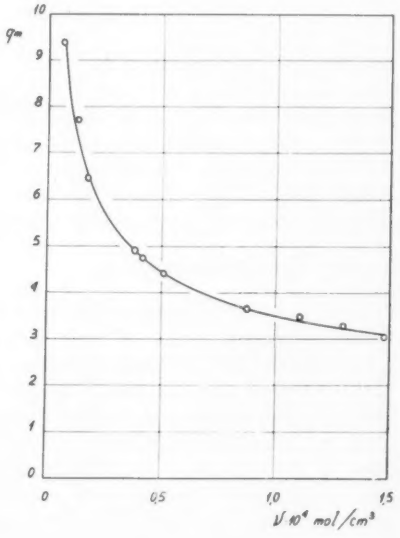


FIG. 9—Volume swelling ratio in benzene at 25° C. for cross-linked ethylene-propylene copolymer, as a function of density of cross-linking.

quantity of peroxide used for the cross-linking, calculated on the basis of this theory, corresponds well enough to that predicted by chemical theory. The properties of the polymers open up a vast field for their use as raw materials in the production of vulcanized rubbers, if proper methods of vulcanization are employed. These predictions have been confirmed by experimentally determined properties of the vulcanized copolymers, both in the presence and in the absence of reinforcing agents.

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Coming Soon . . .

Melt Flow Properties of Linear Polyethylene—By A. P. Metzger and C. W. Hamilton, Battelle Memorial Institute, Columbus, Ohio.

As knowledge of olefin polymerization grows, the number of commercially available products increases at a bewildering rate. To help processors select the materials which can be fabricated most easily with maximum quality, this paper evaluates test methods in relation to the crucial factor of melt viscosity, itself a reflection of the molecular structure. Measuring flow length in a spiral mold is suggested as a practical yardstick to indicate processing potential.

Improved Butyl Rubber Vulcanizates—By C. J. Jankowski, K. W. Powers and R. L. Zapp, Enjay Laboratories, Linden, N. J.

How superior butyl rubber vulcanizates are obtained by replacing normal sulfur loading and accelerator with sulfur donor and low sulfur—high accelerator vulcanization systems.

Engineering Factors in Coating with Silicone Rubber for High Temperatures—By H. I. Silversher, R. C. Shaffer and R. A. Landry, Western Backing Corp., Culver City, Calif.

When glass cloth is combined with a silicone compound, the resulting product derives mechanical strength from the glass in addition to flexibility and protection from the rubber.

The Role of Carbon Black in the Thermal Oxidation of Polyolefins—By W. Lincoln Hawkins, Bell Telephone Laboratories, Murray Hill, N. J.

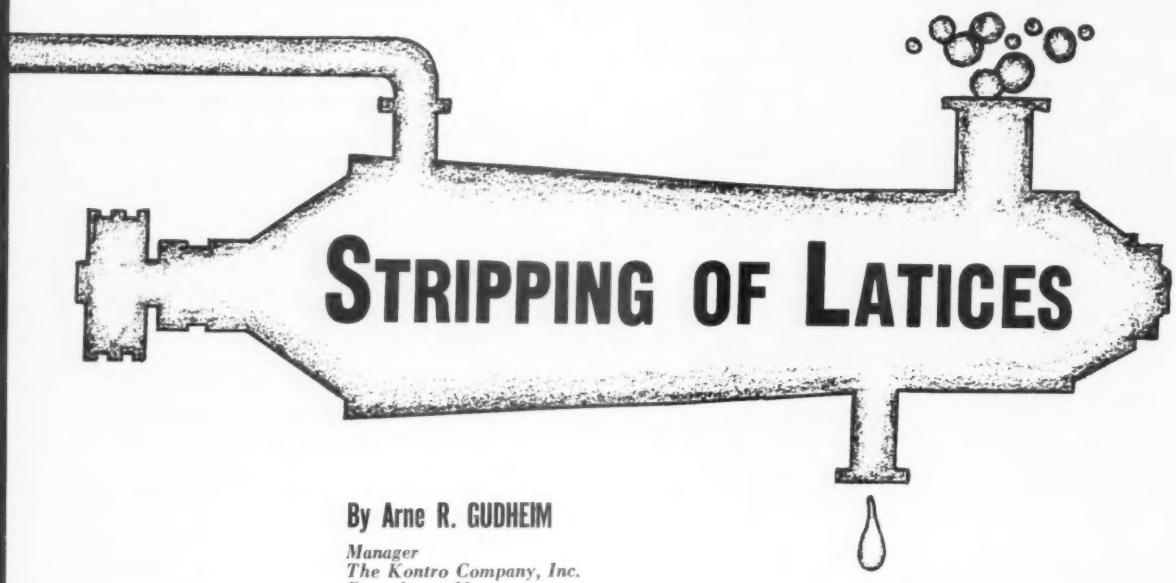
The ability, exhibited by many carbon blacks, to inhibit the free radical oxidation of polyolefins is dependent on the presence of certain reactive groups on the surface of the carbon particles. Heating in the presence of oxygen or sulfur increases the number of reactive groups to produce a much more effective antioxidant.

PLUS R/A SPECIAL INDUSTRY REPORT

Music for the Rubber Production Line

Pleasant listening may mean greater efficiency and higher output, according to recent psychological studies. The objective is to soothe the harried worker without putting him to sleep.

Continuous Automatic Concentration and



STRIPPING OF LATICES

By Arne R. GUDHEIM

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The Kontro Company, Inc.
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THE NUMBER of converting operations utilizing synthetic latices with higher than normal solids seems to be increasing. Usage has expanded to the 55 to 65 per cent solids range, quite an advance over the normal 40 to 45 per cent. This has raised the problem of concentrating such materials with a minimum influence on their quality, especially their mechanical stability.

There also seems to be an increasing demand for latices having lowered styrene content, for example 0.05 per cent or below, rather than the 0.10 to 0.15 per cent which has been more common. Heretofore it appears to have been the usual practice to carry out concentration and stripping operations as separate steps for maximum efficiency, but this can now be done simultaneously with a new technique designed to make both procedures as economical as possible.

It is, of course, necessary to remove water as steam vapor in any sort of latex concentrating operation. This is often done in large vacuum-operated kettles heated with hot water or low-pressure steam in closed interior coils, or by means of a jacket surrounding the vessel. Such a method has an inherent limitation: the heat transfer surface invariably "fouls"—often rather rapidly so—materially decreasing heat transfer and, in turn, capacity. There is also the disadvantage that the heat transfer surfaces are usually difficult to clean. A perhaps more significant limitation is that concentration by vacuum kettle heating is a rather lengthy operation, during which the mechanical stability and other vital properties of latices may be perceptibly lowered.

More advanced means are also being used for concentration, such as the continuous recirculation of latex at a reasonably high velocity through a pressurized heat exchanger, allowing it to discharge into a vacuum-operated tank while removing some of the water as steam. The material from the vacuum tank is then recirculated through the heat exchanger until the desired solids content is reached. Such a procedure represents a great improvement over the aforementioned batch method, but considerable time is still required to complete the operation with latex at elevated temperatures for prolonged periods.

Difficulties With Old Methods

Those who handle latices know that these materials are usually troublesome to pump without coagulation, always being prone to foam excessively. Such difficulties may be encountered with the circulation procedure, too, since excessive foaming often occurs during pumping from the pressurized heat exchanger to the vacuum operated flash vessel.

It has been found that almost any degree of solids concentration up to 60 or 65 per cent—irrespective of the initial solids content—can be obtained in a single positive pass requiring only seconds with a controlled reverse-taper processor (Adjust - O - Film, made by Kontro Co., Inc.). Such a machine is shown

in cutaway Figure 1. Figure 2 illustrates the manner in which the unit can be arranged for latex concentrating-stripping.

Basically this equipment is a newly patented, centrifugally-wiped, thin-film controlled processor. As may be seen in Figure 1, it consists of a reverse, slightly tapered cone, surrounded by a heating jacket for use with hot water or steam. Inside the cone is a rotor shaft to which are attached a series of blades that just barely miss touching the heated wall. Attached to one end of the rotor shaft is a separator which "knocks out" any foaming and/or latex entrainment that may be present to prevent its reaching the condenser.

How the Tapered Cone Operates

Latex to be concentrated is sucked in by the vacuum in the unit through a flow control system as shown in Figure 2, entering the processor at the indicated point. Any dissolved gas, such as air, is immediately withdrawn (while the styrene remains), and the latex is centrifugally wiped in turbulent manner against the heated cone. In only a few seconds it is pushed over the heated wall to the outlet by the action of the blades, while the latex is concentrated to the desired degree. In the particular arrangement shown, the concentrated product falls by gravity from the unit through the tailpipe into a latex well, where it is transferred to one or more holding tanks. The accompanying table summarizes typical operating performance.

During the almost instantaneous single pass through the processor, the desired solids content or concentration is obtained automatically by instruments which regulate the feed rate and steam supply to the jacket in proportion to the quantity of feed. The evaporated water passes through the separator, where any foaming or entrainment is overcome, then usually into a barometric condenser to be liquefied. There is virtually no influence on the quality, including the mechanical stability, of latices.

Usually such concentration operations are carried out at 27 to 29 inches of vacuum, using a two-stage jet system with moderate pressure steam in the heating jacket. Even latices having 20 per cent or less initial solids can be adequately concentrated in a single positive pass. Before describing the next and equally important monomer (styrene) removal step, it seems best to explain the function of the reverse taper cone in the unit.

Briefly, the purpose of the cone is to develop sufficient back pressure in the thin film to just overcome or nullify the pull of gravity. This permits complete control over "throughput" or residence time, so that, if a latex operation were involved which could not be accomplished in about 20 seconds, then the process would be adjusted to extend 21 or more seconds, or until the desired results were obtained. Without the use of the reverse taper this would be quite difficult, if not impossible.

The cone offers the equally important advantage of gravity-nullifying back-pressure effect that keeps the thin space between the tips of the blades and the heated wall full throughout the entire length of the processing chamber, irrespective of the amount of water removed or the degree of concentration. This, in turn, prevents dry spots along the heated wall followed by "burn-on." Even concentrated latices are

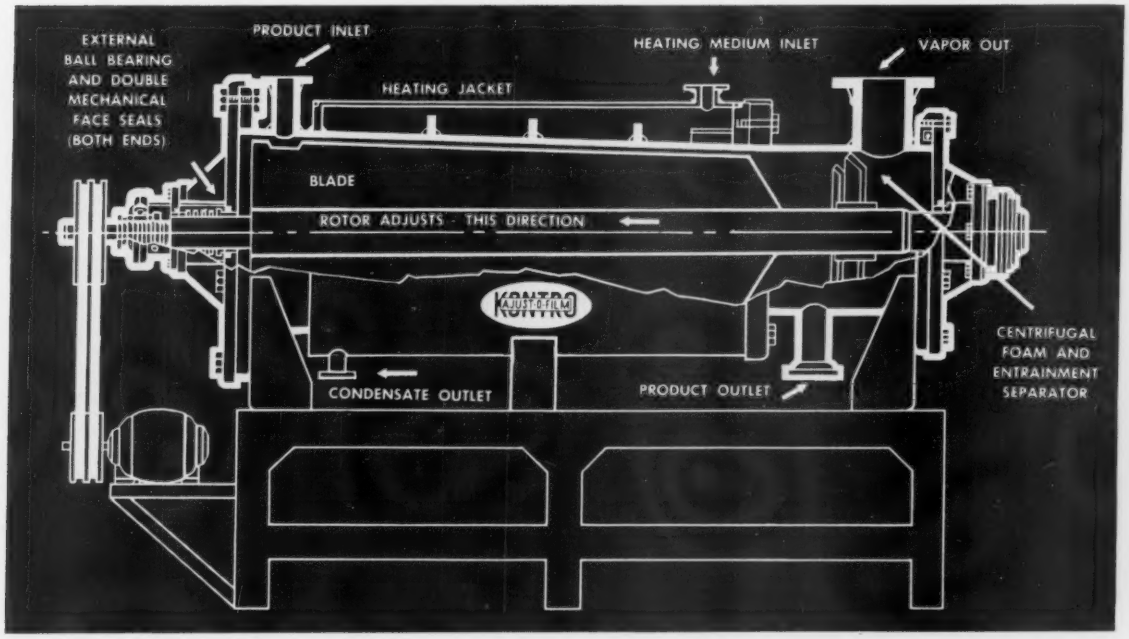


FIG. 1—Schematic diagram shows construction of reverse taper processor for new latex concentration-stripping system.

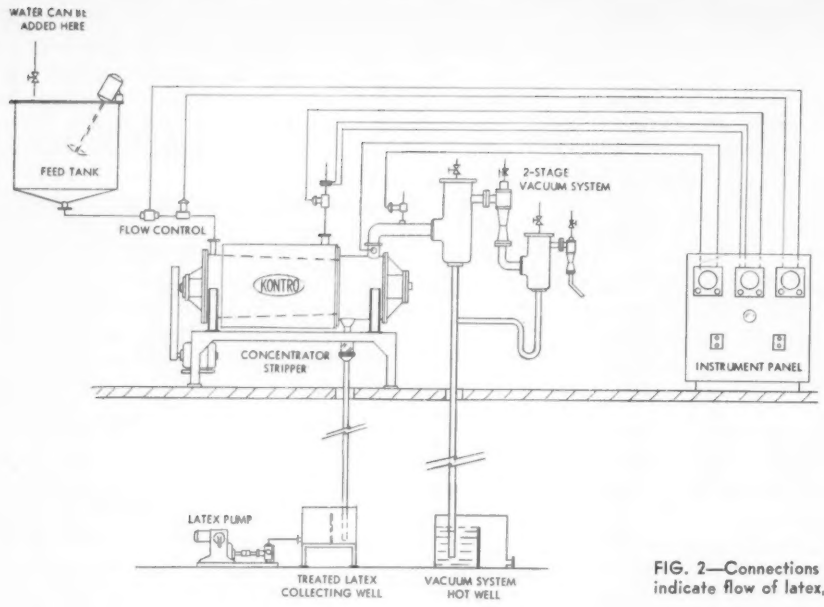


FIG. 2—Connections of the new processor unit shown to indicate flow of latex, water addition and heating stages.

comparatively low in viscosity. If one attempted to concentrate low-solid latices fully in a thin-film manner without a controlled processor, so much water might be removed in the first part of the heating area that insufficient material would be left to cover the latter part fully, with inherent danger of dry spots, hence "burn-on."

Adjusting Blade Clearance

Still another important feature of the tapered construction is its ability to adjust the rotor blade clearance readily to obtain optimum quality and thermal performance. This can be reasonably important with some latices, where the adjustment is made externally without taking out the rotor. Actually, when the tapered rotor is moved in the cone, blade clearance is decreased and the adjustment can be made essentially by mechanical means.

Under certain conditions, the rotor can be moved in sufficiently to allow the blades just to touch the heated wall. Then, by slowly turning the rotor, the heat transfer wall can be cleaned when and if necessary. In addition, controlled processors are normally fitted with manholes at both end-plates, which permit mechanical brushing of the rotor blades, cleaning off film by the use of direct steam (Figure 3).

It has been found that one of the real commercial advantages of these horizontal units is the chance to clean their interior—including heat transfer surface—quickly with a minimum quantity of solvent, without opening the machine. As is generally appreciated, latices vary significantly with respect to stability. Some can be treated for weeks in these units without requiring cleaning of the machine to maintain production, while others need daily cleaning.

Stripping for Lower Styrene

In addition to the need for increased solids materials, there seems to be a demand for latices having lower monomer (styrene) contents. Styrene is often stripped batch-wise by blowing live steam into the bottoms of comparatively large kettles containing latex. These kettles are usually under vacuum, but may also be operated at atmospheric pressure. Large

TABLE—TYPICAL PERFORMANCE OF PROCESSOR UNITS

Size of Unit*								
Model	Heating Area (sq. ft)	Solids Content (%)		Rate (lb./hour)			Approx. Water Evaporated (lb./sq. ft.)
		Feed	Product	Feed	Vapor	Product	
Pilot	1	20	55	70	40	30	40
Pilot	1	40	60	120	35	85	35
No. 1	4	20	50	200	120	80	30
No. 1	4	45	60	400	100	300	25-30
No. 3	20	40	55	2000	600	1400	30
No. 4	40	43	55	5000	1100	3900	25-30

* Ajust-O-Film made by Kontro Co., Inc., Petersham, Mass.

quantities of steam are required for such operations, and the process may require hours for satisfactory reduction. Styrene is also removed continuously in bubble-cap type stills. Such units require less steam per pound of styrene removal than batch operations, at the same time exposing the latex to much shorter processing periods.

The styrene content of latices can also be reduced very effectively and to unusually low levels in reverse taper controlled processors. This can be done independently of concentration or simultaneously with it. When both concentration and stripping are required, it is much better to do it simultaneously.

The stripping operation is carried out basically in the same manner as concentration was. It has been found that the styrene reduction is, for all practical purposes, logarithmically proportional to the amount of water evaporated, as may be seen from Figure 4. As shown by this curve, latex with an initial styrene content of 1.0 per cent is reduced to about 0.1 per cent by the evaporation of 30 per cent of water from the feed, and to 0.05 per cent when 40 per cent water is removed. The amount of evaporation can be regulated to give the desired styrene value while simultaneously producing almost any solids content.

Although the data are not clear cut, it appears more effective from a standpoint of styrene reduction to evaporate water from the latex than to use a comparable quantity of blowing steam. A seemingly feasible explanation for this behavior is that, during the very short time the latex is in the controlled processor, the blowing steam contacts only the surface of the thin film or the latex particles and, in turn, removes only the styrene thereon. In contrast, when evaporation occurs, it undoubtedly also takes place within the particles, bringing styrene vapor along with water vapor from their interior.

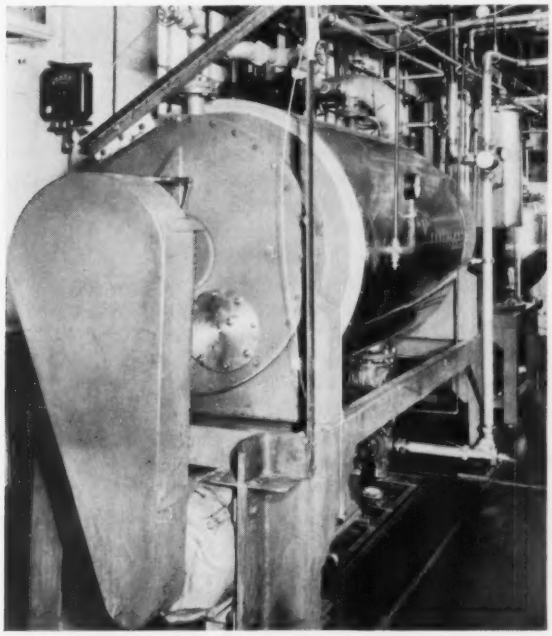


FIG. 3—Close-up of new unit shows manhole at end plate which facilitates periodic cleaning.

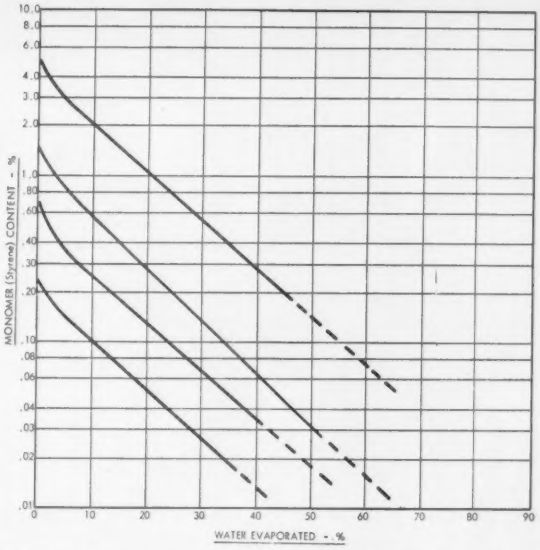


FIG. 4—This graph suggests that styrene reduction is logarithmically proportional to water evaporation.

A Single, Short-Time Pass Suffices

From the graph, it seems apparent that, unless the initial styrene content as well as solids content is moderately low, there is probably not sufficient water in the latex to permit the necessary removal and still maintain the solids content below 60 to 65 per cent, about the maximum feasible. This is generally the case. Therefore, with a new process (being patented), it is necessary to add water to the latex prior to removal of styrene. The amount needed may be readily estimated by taking into account the water already present in the latex, so as to end up with a single, short-time pass to attain both the desired styrene and solids contents. To illustrate, it is of course quite realistic to produce 0.05 per cent styrene latex in a single pass with, say, 40, 50 or 60 per cent solids. Latices having initial styrene contents as high as 2 per cent can usually be processed to the desired level in a single pass, but those in excess of this concentration often require a second pass with the further addition of water between runs.

The reverse taper processor unit employed for both concentration and stripping is of the co-current type. That is, the steam-styrene vapor flows in the same direction as the liquid thin film. In counter-current flow arrangements, where vapor and latex move counter to each other, styrene is partially condensed in passing through the colder incoming feed zone, while evaporating a thermal equivalent of water. Therefore, it is difficult to lower the styrene content below a certain level. In contrast, the vapors in co-current processors become warmer passing through the machine, "pick up" more styrene yet avoid condensation.

MATERIALS HANDLING —

Introduction

Adapted from L. M. BAKER
(General Tire & Rubber Co.)

A recent handbook of industrial engineering gives us the following definition of materials handling:

"Any movement of materials, vertically, horizontally or both, manually or mechanically, in batches or one piece at a time."

The term thus turns out to mean a lot of unproductive and expensive, albeit necessary, work. Materials handling problems confront practically all industries, in terms of expenses running as high as 33 per cent of total labor costs, alone. They are a burden to rubber manufacturers, regardless of size of operation or type of product.

All rubber processors depend on a variety of raw materials: natural or synthetic stock—usually several grades of each, reinforcing compounding ingredients, and a whole host of chemicals required for proper vulcanization and aging of products. Last January, the Akron Rubber group aroused much industry interest by holding a symposium on "Materials Handling." The topic proved a crucial one for suppliers of materials, as well as for the actual manufacturers and the distributors of products to the market.

In answer to demand from its readers, RUBBER AGE obtained the provocative and practical talks delivered by the six speakers as a jumping-off point for a lively panel discussion. The presentations and the ensuing questions from the audience showed an increasing concern with novel production machinery and techniques.

While the field was admittedly broad, and the speakers had to concentrate on their general findings rather than on detailed surveys of all facets, they did shed a good deal of light on the problems in their areas of specialization. Each panelist presented an expert's viewpoint on industry prospects for greater efficiency in handling, process methods and streamlined equipment. Their practically oriented papers, containing a wealth of useful information, are reprinted on the following pages, with a minimum of editorial revision.

PHOTOGRAPH shows speakers, moderator and secretary of symposium held Jan. 29 at the Sheraton Hotel in Akron. Left to right: *(seated)* L. E. Soderquist, Mrs. John Crowe and L. M. Baker who officiated, J. L. Hawley; *(standing)* P. W. Watt, E. L. Hineline, C. W. Hibscher and D. C. Price.

A panel discussion held by the Akron Rubber Group highlights current developments in handling methods and machinery, promising to cut time and costs for suppliers and producers of basic rubber products.

— A Discussion of Efficiency

Raw Materials and Finished Goods Handling

By E. L. HINELINE

(Firestone Tire & Rubber Co.)

The history of material handling equipment in industry is approximately as follows:

The use of monorail and small cranes came into prominence in the early 1920's, especially in the steel industry, which allowed increases in the size of units handled, as well as in the use of power trucks with ramps for handling bundles of steel and wire. Then came the advent of continuous processing, such as continuous wire drawing and better handling of bar stocks in larger packages, and gravity flow from operation to operation.

In the rubber industry during the Twenties, materials were supplied in bale form, fabric in rolls, all dry pigments in sacks, and most liquids in drums. Palletization did not gain impetus until World War II and after.

Channel carbon black was first handled at Firestone in bulk form in 1933; shortly thereafter each plant had some form of single black system with semi-automatic weighing.

Later and after World War II, furnace blacks came into use. These presented a greater variety and different qualifications for each stock. We then had to consider from four to six blacks in any handling system. Because laboratories requested segregation of the makes of blacks, this variety has in some cases amounted to as many as ten. That increased the cost of mechanized storage six to ten-fold and, until recent years, the payout of installing such expanded facilities did not present an attractive investment to management. Here again, the many new types of carbon black being developed further reduced the attractiveness of bulk black handling in most of the tire plants.

Carbon black handling systems started with the screw conveyor for horizontal and vertical movement; then came the bucket elevator for vertical movement to reduce break-down of the black pellets. Other types now in use are transport by air pump, special

enclosed belt systems all requiring special application multi-storage tanks, surge hoppers, rotary or screw feeders, automatic weighing units, dust collecting and feed back units, each properly designed to meet requirements. The cost of installations of the same type varies as much as 10 to 20 per cent, while changes of scope such as multi-storage tanks and physical conditions, will vary the over-all costs as much as 100 per cent. The percentage breakdown of black pellets by the various handling methods is felt by compounders to affect dispersion, and can affect the handling and weighing system to be used.

Costs Represent Sound Investment

Prices for installations run from $75,000 to $150,000 per Banbury for bulk systems, including automatic weighing, which requires the minimum handling of six to eight blacks. Other systems like tote bins cost about $30,000 per Banbury for a two-black system, but require 24 hours of labor for proper bin placement. The rubber bag system is also in use with storage surge tanks to hold 1½ bags at each Banbury. This system requires unloading facilities; a large, special bag handling truck; 24 hours' labor—with costs less, equal or greater than bulk systems depending on physical setup, method of transportation, whether it is necessary to buy or lease bags, and to obtain from the black companies the same rate of black cost reduction.

The nominal savings, including black cost reduction over paper bags, handling floor-space spillage cleanup, and handling of paper bags, should effect a savings of approximately .0075¢ per pound used. River barge transportation of rubber bags shows savings for plants located on rivers, but here again, the benefit depends on operating season and all items entering into costs.

We naturally prefer bulk, because rail tankcars simplify handling, and the unloading time is only three hours for 70,000 lb. There are fewer handling operations and numerous other advantages: less inventory, less floor space and labor, cleaner areas, less waste spillage, etc. Crude rubber is transferred from cars on pallets holding 10 to 225 bales. These can normally be tiered three high with safety, on 48 x 66-inch pallets, or eight bales on 48 x 48-inch pallets. Synthetic in corrugated paper is costly, while carbo-rubber will allow palletization without cold flow, simplifying storage of synthetic rubber.

Clay can be bulk handled and incorporated with black handling systems in separate handling units if they utilize the same unit. Some dry pigments, then, can be bulk handled and in large volume. All liquids should be bulk handled if possible in instances when the quantity warrants the cost. Other dry pigments, where economical, should be purchased in drums, and weighed out directly from the same drums in the compounding department.

Waxes can be melted, again with cost of equipment greatly offsetting simple compounding. At one of our plants, using a total of 31 different dry pigments, only 10 are automatically weighed, the balance are weighed from drums, with lowest possible cost of compounding labor. Such labor will vary as much as 5 to 1 depending on how it has been set up and its difficulties in converting to some form of automation.

Approximately 80 per cent of dry pigments, by weight, can be mechanized. But, here again, duplication at direct Banbury application makes it impractical in large plants where there are more than one or two Banburys involved. Once more, if compounds could be reduced to a minimum quantity of items, automation would be practical but, because of typical rubber plant compounds, it is almost impossible to "sell" an automatic system.

If a large quantity of stocks require a small quantity of pigments—e.g., synthetic tread stock—some automation could be considered, with all other items on manual weighing methods. All bag material should be received from suppliers in unit loads on cardboard base, bag glued to prevent collapse of load, and handled directly out of cars to pallets for storage, eliminating handling of each bag from car to storage areas.

All palletized loads should be delivered to compounding in pallet loads where possible. It does not pay to put bag materials in bins from upper floors for compounding, and this practice is becoming obsolete.

Seventeen Basic Rules

Summing up the above: (1) Handle all materials wherever possible in the largest unit practical to transport it to the usage point for minimum handling costs. (2) Do not rehandle, except in the same or larger unit, or in bulk with automatic weighing or proportioning where that proves economical. (3) Induce reduction in number of materials to make mechanical handling most economical. (4) Eliminate rehandling wherever feasible.

(5) Pile pallet loads as high as possible to reduce floor space requirements. (6) Remember that bulk handling reduces need of floor space and labor. (7) Eliminate the need of costly containers, where practicable, to reduce capital investment. (8) Have vendors supply material on expendable pallets or containers wherever possible and economical.

(9) Standardize load weight to not less than 2,500 lb. units to allow for standardization of power equipment. (10) Standardize truck size throughout plant to, say, 4,000 lb. for 24 inches, except for mold handling. (11) Use standard fork trucks, supplementing where you can with adapters such as forks, side movement, pin or post, and hoist hook attachment, so that the trucks are flexible. (12) Standardize in pallet size wherever possible, 42 x 48 inches being the best standard for all bag and drum material, as well as for use in freight cars and trailers.

(13) Wood pallets are less expensive than steel, with normal usage and turnover, lasting for ten years. (14) Expendable pallets, if furnished by vendors at low cost, may offset the cost of wood or steel pallets.

(15) Steel pallets are more difficult to maintain and repair than wooden ones. (16) Normal raw material warehouse space should be figured as 125 lb. per sq. ft. for hand piling including aisles and voids, but 250 lb. per sq. ft. for pallet piling. All floors should be designed for 400 lb. concentration and 250 lb. over-all loading for fork truck operation. (17) A single story warehouse is more economical to operate, saving on initial cost and labor, eliminating elevators and conveyors.

Untouched by Human Hands

With the advent of automatic curing units, complete conveyorization of cured tires permits handling without human hands touching them until inspection. From 20,000 to 30,000 passenger tires can be handled over one conveyor system in 24 hours, allowing approximately 20 minute surge between curing and inspection for delays, coffee breaks, etc.

The tires are automatically divided into two or three lines for automatic trimming and painting, including both black and sidewall. Special treads, such as winter tires, can be sorted automatically. The black and black-white go through the same trimming, painting and inspection units. Inspection units are arranged to allow maximum time for inspection, loading and unloading being done simultaneously. Sidewalls are inspected in another station, and thrown out for defects by sidewall inspectors. Final inspection can separate bead diameter tires for different routes. Both 14 and 15-inch tires can be balanced on automatic units and marked automatically; white sidewalls can be sorted automatically from black by photo eyes. Sorting of white sidewall tires for buffing still has to be done manually, all finished tires, to be dispatched on the sorting conveyor, are placed on pallets and trucked to the warehouse in lots of 44 to 50 tires per load.

For the handling of finished goods, i.e. tires, we recommend the following:

¶ All tires can be palletized.

¶ We originally developed a pallet for storing passenger tires 5-5 inch with collapsible cross-support panels, at a cost of $10 to $12 in 1946.

¶ It was later found that the collapsible feature was not practical from a standpoint of stability and time required to collapse and dismantle them; and it was not economically practical to ship tires on pallets.

¶ Industry is storing tires three to four pallets high.

¶ A rule of thumb figure for storing passenger tires is:

Warehouse Cost		Per 100,000 Tires
$280,000	2.4 Tires per sq. ft. including all aisles and voids, 3 high	40,000 sq. ft.
$210,000	3.4 Tires per sq. ft. including all aisles and voids, 4 high	30,000 sq. ft.
$700,000	1.0 Tires per sq. ft. including all aisles, hand piling	100,000 sq. ft.
Pallet Cost: 2000 × 15 = $30,000 plus 2 fork trucks = $45,000		

The above indicates considerable savings in floor space on the basis of palletizing.

Automatic Weighing Trends in Rubber Industry

By Carl W. HIBSCHER

(Toledo Scale Corp.)

In any automatic weighing process, there are three basic elements: the scale, the materials handling equipment and the controls. In addition, in automatic weighing, a system is usually a custom engineered and manufactured unit because few customers' processes are identical. Bearing these facts in mind, let us take a look at some of the modern automatic weighing equipment and systems that are being employed in the rubber industry today.

One of the latest devices for classifying treads has been introduced recently. It is an Automatic Tread Classifier utilized to classify tread stock at a rate of 15 treads per minute and to a zone edge accuracy of .05 (1/20) lb. The unit consists of a motorized belt conveyor, a standard "A" type scale lever system, a high speed scale head, an electrical weight transducer and an electronic control unit.

The conveyor employed is of special design. It must be in perfect dynamic balance. This may not sound like a difficult feat, but many conveyor manufacturers informed us they were not interested in constructing this conveyor, because they were not "Swiss watchmakers." The conveyor is also unique in that the gear reduction unit is integral with the head pulley, and the motor is imbedded between the top and return portion of the belt. This feature conserves valuable space, offers no obstructions, and is also a definite safety feature.

To describe briefly the principles of the weighing and control portion of the Tread Classifier: The scale is a conventional floor scale minus the pendu-

lum counterbalanced dial mechanism. It consists of an "A" type main-lever system and a tare-beam lever which utilizes a lifetime fulcrum. This fulcrum is of the flexure plate type, and its main attribute is a frictionless pivot with infinite life. In place of the conventional indicating mechanism, a spring and linear, differential transformer (LDT) are used. Now that springs have been developed that are temperature insensitive and virtually free of hysteresis, they can be used to advantage in "High Speed Weighing." This scale will settle in less than one second, as compared to three to four seconds for a conventional pendulum-counterbalanced scale.

A linear, differential transformer is utilized to transmit an electrical signal to the electronic zoning device, which is indicative of the beam position (or weight). The main attributes of the LDT are great resolution and repeatability, as well as long, maintenance-free life.

How the Tread Classifier Works

The operation of the unit is briefly as follows: The center of the "OK" zone, or ideal weight, is preset on the scale by means of the calibrated poises. By means of a common internal control, the various zone widths can be preset. Let us assume the poises are set to a total of 50 lb. Then taking each zone width set at .15 lb. the unit will classify respective treads into three zones in addition to the "Over" and "Under" zones. The "OK" zone will range from 49.85 to 50.15 lb., the "OK Over" zone varying between 50.15 and 50.30 lb., and the "OK Under" zone will range from 49.85 to 49.70 pounds. All other weights will be rejects.

The electronic control unit determines the zone classification of a respective tread. This unit is composed of an excitation transformer, power supply, reference LDT, respective zone amplifiers of the phase (polarity) sensitive type, a meter amplifier, and respective output relays. A unique feature of this zoning control unit is that a zone amplifier monitors its respective zone edge continually. As a result, no switching is required while the scale travels from one zone to the next, when determining the classification of a particular tread. In addition, these amplifiers are of the phase-sensitive type. That is, they work on a polarity rather than on an amplitude basis. As a result, the zoning control is insensitive to temperature and power source, voltage fluctuations normally found in industrial plants. The unit will perform with equal accuracy over a temperature range of 40° to 120° F. and over a voltage range of 65 to 135 volts. Simplicity of construction marks the phase-sensitive amplifier. It is a two-tube, plug-in amplifier, constructed on a printed circuit board. This unit is as simple an amplifier as can be constructed. This fact, together with the sound principle of phase sensitivity, makes it a "stand-out" as far as reliable, maintenance-free life is concerned.

One thing should be obvious from the above explanation of the tread classifier: the entire unit, other than the belt conveyor, is virtually "static" in nature. There are practically no moving parts. We all realize the advantages of such a characteristic.

In the field of proportioning (batching), there has been much progress. I am sure most of you know what has taken place as far as the storage, feeding and weighing of carbon black, pelletized rubber and oils are concerned. Our most recent experiments and advancements have been in conjunction with micro-weighed oil batching, pigment batching, and simplified automatic batching controls.

The Micro Weighment Oil Batching Scale is becoming very popular in "final mix" batching processes. The scale is of 10 lb. capacity and has the ability to weigh an oil automatically to 1/100 lb. or approximately 1/5 oz. There is no limit to the number of oils that can be handled by this unit. The only limitation is that the total weight of a batch cannot exceed 10 lb. Some of our customers have informed us that this scale has enabled them to replace some of their dry, difficult-to-handle pigments with oils (or liquids) that can be easily stored and conveyed, and accurately weighed.

The valves used inside this unit were the cylinder-operated, ball type rather than the conventional, diaphragm type. We have also reverted to this type of valve on our large-capacity oil scales because of its simplicity, reliability and relatively low cost. In addition, this valve's controllability is virtually constant, regardless of viscosity changes in the oil.

The valve used for the discharge of the weigh hopper is a spherical, seated plunger, type valve. It is free floating during the weighing process, which helps in the achievement of the 1/100 lb. accuracy. The blow down surge tank, in this case, is actually the pipe line from this unit to the Banbury. Ease of cleaning the discharge line and weigh hopper after each batch weighing is ensured by special design of the internal surfaces.

Handling Pigments Automatically

Fully automatic pigment handling is starting to create attention. This is a problem that was not overcome in the past, primarily because of the materials handling difficulties associated with it. Today, however, most scale manufacturers operate a materials handling laboratory, and have progressed with the art and science of handling these difficult materials, so that they can offer a complete, integrated pigment system to their customers in the rubber manufacturing field.

Several types of pigment systems are available. A "portable bin" type system would be employed by companies who utilize pre-blended pigments in their compounding area. The blended pigments are dumped into the portable bin at the blending mixer. The portable bin serves as an intermediate storage means, as well as a hopper. When it is desired to use the particular blend in the compounding area, the portable bin is placed in its respective position on the support frame over the pigment scale.

The portable bin is of special construction, containing a live bottom. That bottom is composed of a series of screw flights, some being used to bring the material into the center, others to transfer it forward. The entire live bottom is powered by a motor and gear reducer, which is mounted on the support frame. The bin and drive motor are engaged by means of a treadmill type, gear engagement. The portable bin supplies material to a small surge bin which terminates in the scale-feeding device, usually a special screw or vibratory feeder. In most cases, it is necessary to keep the head of material in the surge hopper above a minimum level to ensure consistent, nonrestricted flow. The scale (or scales) employed with this system are generally of the conventional type, with exact specifications depending upon relative applications.

Another type of system very similar to the portable bin is the permanent surge bin type. In this case, the portable bin is replaced by a permanent surge-hopper. In addition, the live bottom is usually eliminated by special bin design. The surge hoppers are filled manually by the operator, who utilizes the catwalk on top of the frame.

An additional attachment to the surge-hopper type system is a pneumatic conveying system, used to fill the respective surge hoppers from a remote central point. This feature would only be employed by companies who use non-blended pigments; otherwise, detrimental segregation would be encountered as a result of the pneumatic conveying. The central supply point usually supplies more than one Banbury. Analysis has indicated that the most economical, pneumatic conveying method for this application is a compressed-air powered vacuum system.

Presetting Controls in Formulations

The controls associated with automatic proportioning equipment are continually being improved. This is the most rapidly advancing field in the scale industry today. Automatic batch controls are now predominately of the remote preset type. Heretofore, two general types of presetting devices were used: the vernier dial, and digital dials. Recently, three other types of presetting devices have been introduced: the punched card, the Batchboard and the Formulaplug.

The punched-card type, preset method has the attribute that the formulation is controlled by a supervisor, and is not dependent upon the operator. It also has the ability to accommodate major formulation changes quickly.

The Batchboard was introduced because it has features that overcome some of the shortcomings of the punched-card method. The card system, by its very nature, is not a rugged piece of equipment and, as such, leaves something to be desired when subjected to the environment of a rubber plant. But the Batchboard system has all the attributes of a card system, plus both mechanical and electrical ruggedness. It is also considerably less expensive for most applications. The crossover point in cost is encountered at approximately twelve material-one hundred formula, or six material-two hundred formula systems.

The Formulaplug is becoming very popular because it has most of the advantages of the Batchboard system, and it is very economical. It is electrically and mechanically rugged; also formula changes can be made quickly. The Formulaplug's main attribute is its relatively low cost. It is the least expensive method of remotely presetting weighings available today and, before long, it will undoubtedly become the most popular means of weighing equipment control for the rubber industry.

One Type of System for Modern Industry

An example of a modern automatic control center is based on miniature plug-in component design. This is the modern approach to industrial scale controls. There are many reasons for the switch to this approach, some of the more outstanding ones being: (1) Miniature component reliability and life are greater than those of conventional, industrial components. (2) The contact characteristics of a miniature relay are superior to those of industrial control relays. (3) The scale circuits are designed so that the large handling ability of conventional industrial control components is unnecessary. (4) The miniature components are enclosed and dust-tight, to all intents and purposes.

(5) Control center size is substantially reduced. (6) Individually, the miniature components are far more economical than conventional, industrial control components. (7) The miniature components make mass production of sub-assemblies possible. This results in lower manufacturing cost than could be achieved when using conventional industrial control techniques. (8) Maintenance with miniature components is quicker and easier. Each has a pilot light associated with it, either in the component itself or on the panel, clearly indicating the condition of the component. In addition, they are of the plug-in type, permitting easy removal and replacement. (9) The maintenance stock required is reduced to a minimum, in quantity as well as cost, because only seven basic components are needed.

This type of control system has enjoyed almost immediate acceptance by industry, including the rubber industry. I am sure you will see it used at an increasing rate in other control applications beside weight controls. Now that some of the modern trends in scales, materials handling equipment, and controls have been discussed, I think it would be apropos to briefly discuss some of the trends in weighing techniques in the rubber industry which we may expect to see during the 1960's.

We believe the tread classifying equipment, as previously discussed, will show little change; the basic principle of the scale is definitely here to stay because of its great accuracy and repeatability. Minor improvements will be made in the controls to achieve full, solid state (static switching) control type. We believe further, that the basic classifier will be em-

ployed in many new applications. Examples of a few are: "closing the loop" in the extruder feed control, so that the required tread stock weight is automatically maintained within tolerance, without operator attention; classification of finished tires; classification of packages in mechanical goods plants.

Prospects in Batch Weighing

We also think more noticeable changes will be made in "proportioning," or batch weighing equipment. Mr. Andrew Hale of Hale & Kullgren, Akron, Ohio, recently introduced the high-speed automatic mill in a paper, "New Rubber Techniques for the Sixties," presented at the International Rubber Conference in Washington. Briefly, Mr. Hale predicted that high-speed automatic mills will replace the Banbury and its associated equipment, except when used as a masterbatching device. He predicted that weighing will be done in small increments, on a high-frequency basis, so as to, in effect, obtain a continuous flow of raw material to the mill. We believe that the fulfillment of Mr. Hale's predictions is inevitable.

We are sure that the weighing processes will be done on a small incremental basis, as Mr. Hale says, rather than on a continuous basis, because the former lends itself to much greater accuracies. We have recently developed a light capacity scale utilizing the scale principles of the tread classifier (a mechanical lever system with a spring counterbalance force), that is able repeatedly to weigh a 25 lb. batch of sand to ½ gram. Sand, of course, is an ideal material.

The main problem in utilization of this scale is the performance of the material handling equipment associated with it, since it must have a consistency commensurate with the scale accuracy. We believe that it is going to be very difficult to improve the consistency by improving the materials handling equipment. The major contribution will come from improving the manageability of the material itself. We believe the rubber industry will soon demand that all its bulk materials, especially pigments, be pelletized. You are aware of the cost reductions and improved handling ability that were obtained by pelletizing carbon black and rubber.

Another facet that indicates the necessity for complete pelletization is the fact that the rubber industry is going to require greater flexibility in its batching equipment. Today, the materials-handling portion is designed to handle specific ingredients but, for economic reasons, it is often desirable to use substitute ingredients. In some cases, the material cannot be handled by the existing materials-handling equipment, and a problem arises. To obtain a universal design and complete flexibility, pelletization seems almost mandatory.

Weighing controls are going to continue the process of evolution until the use of solid-state (static switching) type becomes universal. This will be brought about by the increased demand for dust-infallible, maintenance-free, control equipment. As a counterpart to this equipment, the batching-cycle logic will be stored on magnetic tape or some other form of solid-state storage. The magnetic tape reader is a static device. Magnetic tape will become necessary if the operator-less automatic system is to be achieved. It has the advantage that it can provide input logic to the system without having to be attended by the operator. Toledo Scale, as well as others in the scale business, is well prepared to aid the rubber industry in its pursuit of greater automation, and we offer our engineering talents to solve your present day, and future problems.

Handling in a Mechanical Goods Plant

By Don C. PRICE

(Monarch Rubber Co.)

Monarch Rubber, as some of you may know, is a very small company in comparison with most of its Akron neighbors. Historically and economically we would be known as a contract shop.

The early part of our manufacturing history existed mainly from the production of small quantities of solid tires and industrial hose. Today, we have a high-level output of motor mounts and other automotive suspension components, in addition to our original products. Over this period we have developed some unique and effective materials handling methods. Consider, for a moment, the wide range of devices and equipment necessary to handle 500 separate products varying in size from a ⅛-inch diameter kitchen cabinet door bumper to a 48-inch diameter solid tire with a 3-inch steel rim. All of this, I might add, under the same roof.

Currently, we are using materials-handling equipment which ranges in size from a cigar box-like tote pan to a "Fort Canaveral" size 25-ton bridge crane. For all practical purposes you, like ourselves, can see the difficulty in providing any degree of standardiza-

tion in this case. The problem further increases slightly because many customers' requirements, at least in automotive goods, are dictated by yearly model changes.

Many of our high production automotive parts are of rubber-bonded-to-metal construction. Since this process seems to have a future in our business, a metal stamping plant was built nearby our rubber shop. Here we realized the importance of reducing handling cost. Here also developed a continuing program of constant improvement that eventually spread plantwide.

A Problem in Handling Scrap

As the production of metal parts increased, so did the production of steel skeleton scrap. By the time we had decided to do something constructive about handling this waste material, we were generating about 15,000 lb. per 8-hour shift. The solution to this problem had to be solved with some reservation and by taking into account these basic considerations: (1) The container, or box, must be adaptable for handling most of the finished metal parts as well as scrap. (2) Loaded, the container must weigh less than 6000 lb. gross. (3) The container must be relatively inexpensive and low in maintenance cost. (4) Any attachments for lift trucks could not interfere with other methods in use throughout the plant. (5) Amortization for this program must be short, in terms of weeks.

The solution of this problem appeared to be in improving the present method. We began by making a complete analysis of the present handling system. This work entailed making flow charts, process charts, and elemental time studies. Even the proposals that were made showed in detail the flow of material, estimated time elements, and cost of direct labor and materials for one method over the other. It should be pointed out, however, that marketing steel scrap is an important part of a profit picture for us in this operation.

Actually, the best method, at least on paper, included the purchase of a $900-plus hydraulic mast attachment for a lift truck. Since we were in no position to spend this amount on all of our trucks, an alternative solution had to be found. By the good old biblical method: "Seek and ye shall find," and a few hard-earned failures, a hand-operated, mechanical-mast attachment was eventually developed at a total cost of $110, complete. (Incidentally, this attachment is currently available on the open market for $48.)

By the generous cooperation of a materials handling equipment supplier, a standard bottom dump box, or Work-o-Matic box, was slightly altered to fit our new mast-attachment. We are happy to say that the program was successful beyond our greatest expectations. Later studies showed that the new handling method saved a total of 45c per 1,000 lb. of scrap. On a 3-shift basis we had a total 12-week amortization period.

Today, the same type box initially used for moving scrap is finding use in every phase of our motor-mount production. In other words, this same box makes a complete cycle from the presses in metal stamping to the metal preparation department at the rubber shop; from there to molding, and eventually to finish-trimming and inspection. After the product is put in the customer's packing container, our Work-o-Matic box is returned to its original job of hauling scrap, and a new cycle begins.

In conclusion, I would like to mention one other project that has been satisfying to us. Last year our company received a contract for an unprecedented number of molds for one automotive part. This job involved using 14 molds to produce daily customer requirements of 7,200 parts of the rubber-bonded-to-metal type.

Both for competitive reasons and profit outlook, it was necessary to reduce the manpower requirements in molding to 4 men per 8-hour shift; that is, 2 men for every 7 mold presses. Since, in the past, we had not used more than 4 molds for any part, it was necessary to reorient our thinking and rearrange the molding process. Formerly 2 men using an electric chain drop and 1 fixed, floor-mounted, knock-out frame handled a job very well. This year the same 2 men and 1 chain drop would have to handle 7 molds—at least according to plans.

How Two Men Operate Seven Presses

Frankly, I wish we could have accomplished the project as easily as it is to tell you about it. The problem was finally solved by reversing our present method. We built a hydraulically operated, knock-out frame called the "shuttle car," operating along the mold line to receive each mold and eject parts from their cavities. An interlock was put on each mold press for positioning and for operator safety. Power to operate the shuttle car comes off the same trolley duct which formerly operated chain drops. Finally, two men did operate seven mold presses successfully.

Because of our position in the rubber industry, wide product differentiation and short model years necessitating short amortization periods for equipment, we find that any small success we might have in material handling methods or any equipment innovation is based, to a large degree, upon building cooperative work efforts in the organization. Our employees are encouraged to participate, as much as possible, in decisions that affect their jobs. This, we hope, will integrate everyone into an efficient working team.

This centralizing of responsibility and authority for all plant handling has resulted in many benefits such as: (1) Increased effectiveness; (2) Lowered costs; (3) Trained operators available at all times, eliminating necessity of assignments in manufacturing departments for absentees and vacations; (4) Standardization of equipment; (5) Versatility of trucking employees able to handle all kinds of jobs, and (6) Rapid service in emergencies.

Plant Transportation

By P. W. WATT

(B. F. Goodrich Co.)

Efficient movement of materials is one of the most important objectives of our management. At any plant site attaining this objective is always a real challenge. In our own experience, this responsibility has been hardest to fulfill in the company's principal Akron plants.

Many of our facilities here predate modern design concepts which are based primarily on meeting requirements for the unimpeded, efficient flow of materials. As a result, our materials handling problem is complicated by multi-level factories with limited elevator and floor-loading capacities. This combination of circumstances often gives rise to transportation problems which seem to defy solution. The limiting physical characteristics of our building layouts, compounded by the immense variety and volume of materials that must be handled, magnify the complexity of the problem. To complete the picture of the task we face, we cite the management concept that any handling systems adopted must be adaptable, not only to current situations, but also to changes the future might bring.

In 1917, a separate department was set up, which today has approximately 175 employees engaged exclusively in transporting intra, inter-plant materials and finished products. The complex nature of the transportation department's assignment may be better realized, perhaps, when it is understood that, for their manufacturing operations, our Akron plants require more than 10,000 separate materials. These run the scale from bales of rubber weighing up to 250 lb. to small quantities of pigments and fillers used in manufacturing many rubber products. This transportation department does not have jurisdiction over the relatively smaller handling within departments. Such handling is the direct responsibility of the production department superintendents.

The company purchased its first electric low-lift truck in 1917 to hail the start of a new era in factory transportation systems. Since then, with increasing emphasis laid on the speedy transport of materials at the lowest possible cost, the system has been expanded until today we have 80 industrial trucks of various types, 25,000 skid boards, 8,000 pallets, and 200 trailers, in addition to numerous other pieces of miscellaneous equipment.

Most of the transporting is done by electric trucks because of their low maintenance cost, long life and dependability. In our experience, gas trucks have been found to give better performance for unloading palletized pigment and synthetic rubber. There are also locations where pneumatic tires are a necessity if floors are to withstand the punishment of heavy fork-trucks. Here, too, it is necessary to have gas trucks since electrics are not so equipped.

Centralizing Equipment Control

The company's transportation department has control of practically all powered handling equipment, and acts in an advisory capacity to outside plants. Proposed purchases of all powered handling equipment must be approved by this department. It has its own mechanics, who are trained in the maintenance of all types of handling equipment such as yard cranes, bulldozers, railroad cranes, Diesel engines, industrial trucks, (gas and electric) motor trucks and trailers, walkies and hand trucks. Maintenance on all such equipment in the plant is handled by this department.

Battery-charging maintenance and repair facilities for 120 batteries for 80 ride-type trucks are centrally located in the basement directly off the main tunnel, an underground link between principal buildings at the main plant site. Some walkie batteries are charged in this area, but the majority are charged in the areas where used. Batteries are charged on racks equipped with roller conveyors. When a battery is changed, the driver—with the help of the battery attendant—makes the complete change in 1 minute. He shoves the discharged battery from side of truck into empty charging space, moves truck to charged battery, pushes this into truck, secures battery and terminals, and is on his way. Some batteries are charged in the trucks on night shift.

An index card is made for each battery, showing the purchase date, charging history and major repairs. They average 2000 to 25000 cycles during their 5 to 7 year life. Equipment such as skids, pallets, racks, boxes which is used generally throughout the plant, is furnished by the transportation department. The accumulation and return or supply of empty equipment is also the responsibility of that department. Liners, shells, tote boxes, hand trucks, etc. are the responsibility of individual departments.

Actual costs of moving the materials needed for the daily output of more than 50 multi-storied buildings, in which approximately 9,000 production workers are engaged today, have been under continuous study since the factory transportation system was

first established 42 years ago. Our company figures internal transportation costs by adding the costs of moving raw materials from processing operations to production departments, and of finished products from production departments to shipping rooms. Each cost is separately added, and the total is then weighed against the total poundage of finished goods of each of the three principal manufacturing divisions: tires, industrial rubber products and aviation products.

B. F. Goodrich uses a unit-incentive arrangement for driver compensation, based on standards established in accordance with the company's regular incentive system. Each trip or move has a value according to which the driver is paid. A chart has been developed from which the value of any trip or move can be read. Standards are paid on "loaded trips" only, which makes it necessary for drivers to get return loads to develop high unit-hours.

To ensure loaded operation for a maximum period, it was necessary to design and install a central dispatching system. Routes of travel were carefully studied. The three most frequently passed points were selected for the installation of dispatching stations. At a central point, dispatching operators receive telephone requests from the various departments for trucking service. These requests are relayed by telautograph to one of the three field dispatching stations, and there transmitted to the first available truck operator. This method of written orders permits a foreman to make frequent scooter trips throughout his area, and yet have orders to fill upon his return.

Planning and Recording Movements

The basic material movement plan consists of two separate but coordinated parts: (1) a simple written order system for material movements; (2) time-standard charts covering all possible trucking moves from department to department. The order system utilizes small printed pads of orders on which the name of each specific division appears. Transportation costs are charged to the division that requests the movement of the material.

Forms are in interleaved carbon sets of three, consisting of a white original with yellow and pink copies. The white original stays in the issuing department as proof that an order was written. The pink and yellow copies go with the load. When a trucker is dispatched to deliver a load, he lifts the pink copy and enters on it his payroll number and tractor number. He turns in this copy to the timekeeping department at the end of the day.

The time-standard charts list standard work units earned by the operator for each move. Every possible move, i.e., from every building to every other building, has a standard. In addition, a standard of 2.5 work units was established for each time that an operator must use an elevator during a move. A value of 1.0 work units was established for each move between locations within a specific department. And a value of 2.5 work units was set for the delivery of empty skids.

Many factors, other than the actual transportation itself, contain elements that offer potential savings. Some of these are within the control of the department head. As previously stated, handling costs are charged directly to the department shipping the material. If a department head suspects that his costs for shipping a particular product to a particular location are excessive (a fact he can verify by calculating total dollar value of move tickets issued), several avenues of investigation are open to him.

Ways To Reduce Costs

In the first place, changes in the location of stockrooms or reorganizing of production lines may accomplish a reduction in the distance between the shipping point within his department and the destination. Second, investigation may uncover possibilities of reducing the distance to be traveled by the installation of bridges, or ramps, at a point between his department and the material destination. Third, by studying skid-load sizes, he may find it possible to ship the same quantity of material in fewer total loads. The method of loading may be changed. Special skids that will hold more material may be designed; or the shipment may be palletized.

The suitability of the equipment in use is continually under examination by the transportation department. It has been determined, in general, that equipment speed, because of building limitations, must be limited for safe operation to 5.5 miles per hour.

When equipment has to be replaced, several factors other than operating characteristics must be considered: (1) Determine the maximum weight of the equipment plus the maximum and average loads that it will be required to handle. These facts are important, particularly in multi-story operation because the maximum safe floor and elevator loads may well be limiting factors. (2) Determine the length, width, and maximum height (in case of fork lift trucks, for example) of the equipment. These facts are important because elevator sizes, aisles widths, and potential storage heights (particularly in receiving, shipping, and warehousing operations) may be determining factors. (3) Establish the actual physical distance over which the equipment will operate and the locations it will serve. These considerations may limit the speed of equipment that can be used. (4) Determine the type of material to be handled and volume that must be handled in a given period of time. Where loads are likely to be light and intermittent, the need for a specific truck capacity may be indicated. Where loads are determined to be of both substantial weight and physical volume, and where total quantity shipped per unit time is large, the purchase of tractor and trailer equipment, may be a necessity.

As important as efficient, low-cost handling of materials is to our management, more important still is the framework of safety within which our plant transportation systems must operate. We never con-

sider it a digression to discuss safety when we talk about our transport methods.

Safety is an important word in our industrial language. Walk through any of our manufacturing plants and you will see what I mean. Posters, caution signs, mirrors erected to show coming traffic around blind corners, painted pedestrian lanes, workers wearing eye protectors and safety shoes—these are only a few of the visible efforts by industrial safety engineers to keep our plants accident-free, keeping safety foremost in every worker's mind. Within the past 10 years, we have seen a decline of 90 per cent in industrial injuries within our own company. The transportation department likes to think it can rightfully share some of the credit for this notable achievement.

Fostering Safety Consciousness

Employees of our transportation department could be a menace to safety, except for proper indoctrination and training. They propel their vehicles and cumbersome loads throughout all departments along aisles where other employees are working or moving. The potential hazards in such an operation have been overcome because, with our operators, safety has become a state of mind. Drivers and maintenance men are encouraged to wear safety shoes for their protection.

A few of our safety rules are: (1) In case solvents or cements are upset, do not move a tractor until Plant Protection has the area completely cleaned. (2) When leaving electric truck for lunch period, smoke period, etc., the battery must be disconnected. (3) Use horn at all blind corners. (4) Install caution lights or horns, where ramps go into tunnels or yards. (5) All motor trailers must have back wheels chocked with 4 x 4's at all times.

Inter-plant transportation is handled from outlying areas via motor trucks and trailers. Motor trucks are used between the reclaim, adhesive and chemical plants for deliveries and shipping of raw materials. All motor truck operations are also paid on an incentive basis. Plant transportation is an important factor in the end costs of products justifying intensified study for increased efficiency.

Automated Curing Room

By L. E. SODERQUIST

(McNeil Machine & Engineering Co.)

Automatic and semi-automatic handling of passenger tires to and away from Bag-O-Matic presses is a relatively new development. Ever since the introduction of the diaphragm or Bag-O-Matic type of curing by the tire industry, we have realized the possibility of automation. Until it was recognized by the rubber industry that automation in itself was not only a labor-saver, but that from 15 to 25 per cent more production could be obtained from the presses, did the industry take the forward step necessary to give it a trial. Since the first installation three years ago, consisting of 80 twin Bag-O-Matic units in one plant, there have been many others who have also elected to take the same course. As a result, in North America today, there are 32 separate installations of semi or completely automatic operations.

Due to circumstances explained later in this article, there has been no one standard technique accepted throughout the industry. McNeil, as pioneers in this automation, have worked very closely with the various tire manufacturers attempting to recommend the methods which best suit individual plant needs. There are various factors that decide these needs and, as a result of these factors, there have been three distinct types of installations. Although the function of the press itself remains pretty much a standard, the equipment carrying the tires to the press and away from the press has been designed around these three variations.

As explained above, one of the major factors in automation is the increased production that is obtained. In the manual operation of presses, it was necessary that all presses in a line open in sequence, so that the operator could advance from one press to the next. In the semi or fully automatic press, due to the fact that the green tires are always waiting at the press while a tire is being cured, it is possible for each press to operate independently. The curing cycle of the press can be set for the minimum cure for the particular tires being cured. With shorter cures becoming increasingly popular, this fact appears even more important.

Taking into consideration that individual operation is possible in automatic presses, we have one customer today operating 64 automatic 40-inch presses on an average 14¼ minute cure, which delivers 192 tires per day for each twin press. We have found from experience that presses can be operated semi-automatically taking advantage of the independent operation of each press, as long as there are two green tires ahead of each mold position. This

brings us to the first type of semi-automatic operation.

We have developed two different types of loading conveyors which are capable of keeping in reserve two tires per mold position. One of these is known as the Vertical Chuck Loader and the other as the Pan Loader. An operator is required for the placing of green tires either on the chuck table or in the pan in front of the press. Because he can place two green tires in front of each mold position, he does not have to return to the press at the end of each cure and, therefore, can service the units in sequence, placing one or two tires as required.

Conveyors Speed Production

Regardless of the type of equipment supplying the press with green tires, the cured tires are expelled from the rear of the press onto a flat belt conveyor which automatically carries them to trimming and final inspection. This type of installation is the simplest type which we have to offer and, as far as increasing production is concerned, will give the same increase as a fully automatic installation. This type of installation is normally recommended if the ticket on the tires requires many sizes or, what is known in the tire industry, as "cat and dog" production. Naturally, in an installation of this type, a suitable conveyor system must be installed that will carry the various size tires to the region of the operator, so that he can keep a stock pile of green tires on racks or other suitable arrangement, ahead of each press. Without this stock pile, he cannot keep the presses supplied for maximum production.

The second type of installation, that has become quite popular, still requires an operator but, instead of servicing each mold position in the press with two tires, he services a loader which will carry from 6 to 10 tires depending upon the type of installation. This loader has been nicknamed the "coal loader" because of the similarity. We have built several different types of these loaders for both front and rear-loading of the press. Where front loading is used, these conveyors are designed to carry tires up an incline onto the press loading chucks. Such a conveyor acts as a storage or festoon for six to eight green tires and it automatically advances the green tire to the loading chuck when the green tires are required. This type of installation requires more capital investment than that mentioned in the first type. It also requires more floor space; however, it does handle a "cat and dog" installation and does require less handling of the green tire by the operator. Not only this, but the operator can schedule his return to the press according to the number of green tires in front of each mold position. To conserve floor space we have made similar conveyors where the inclined loader is at the rear of the press, and carries the green tire over the take-away belt and press onto the loading chuck.

As mentioned before, the rear loader requires less usable floor space allowing for more tires in storage. The only problems created by this type of installation is that of ventilation. Because tires are stored immediately over the hot press, caution must be taken to keep the tire from getting too warm and "wilting."

The third type of installation which we have to offer is the fully automatic method. Here the presence of the operator in the curing room is completely eliminated. As of this date, we have three installations which are operating satisfactorily, and we recommend this method when the customer plans to cure large quantities of tires for reasonably long runs.

This type of installation is termed the "Shuttle Pan Loader." Each mold position on the press is equipped with a horizontal loading chuck which is an integral part of the press itself. In front of each chuck is a shuttle pan serving as a receiver for the green tires which are automatically dropped from the conveyor. It then shuttles the green tire onto the loading chucks, as the chucks set up a demand for the tire. The service conveyor used in this particular installation can best be described as a clam-shell or a scissors-type conveyor, which holds the green tire with its axis horizontal and surrounds the green tire in such a way, that it is capable of opening and dropping the green tire directly downward.

Operating a Fully Automatic System

The tires come from the building machine, each size on a separate belt conveyor. They are carried by this belt conveyor to an automatic sorting station. The press servicing conveyors run continuously on a chain conveyor. Each clam-shell is equipped with an adjustable flag or indexing system so that it will select only the tire for which it is adjusted. This continuously running service conveyor will pass as many stations as there are tire sizes. At the right station, the clam-shell is automatically opened, and the green tire is mechanically placed into the clam-shell conveyor.

From the loading station, the conveyor travels to the curing room, where it passes down each row of presses in the room. At each mold position, there is a selector arranged automatically so that only the right size tire can drop at the right station. As the green tire reaches this station, and if the shuttle pan in front of the press is empty, electrical switches will operate, and the green tire is deposited into the shuttle pan where it will remain until the loading chucks on the press require another green tire. As long as the green tire remains in the shuttle pan, the indexing system is such that no other green tire will drop into that position.

Since these are mostly twin presses, the electrical system is so interlocked, that a green tire must be in both pans before operations can proceed. With this type of installation, the tires are dispatched automatically to the press. At the press, there are again two tires in reserve: normally one on the loading chuck and one in the shuttle pan. This places enough reserve at each mold position to take care of any

lag for the next green tire arriving at the press. In the event that a particular green tire does not find a station at which to drop, it merely returns to the loading section and continues back to the press room to make its second round and by this time it normally finds a drop position.

After the tire is cured in the press, it is again discharged from the rear of the press and carried by belt conveyor to final inspection. This type of installation is no doubt the most efficient which we have to offer. We are working today on an automatic, card-type system which, we hope, regardless of whether it be for a "cat and dog" plant or long runs, will handle tires completely automatically from the building machine to the warehouse. So far we have discussed only the automatic handling of passenger tires. We have installations of 55-inch truck-tire Bag-O-Matics, which have also been semi-automated. Although these are variations in these installations, at the present time we have not attempted to place more than two green tires ahead of each mold position.

Pan Loading Minimizes Cure

In several of the installations, we have adopted the pan-loader principle, whereby the green tires are dropped into a pan at floor level where they are automatically elevated and placed on the loading chucks. The pan, in the meantime, automatically returns to the floor, and a second tire is placed in the pan. Again it is elevated, but does not go onto the chuck until the chuck is empty. This places two tires in reserve, and makes possible the minimum cure for each press, also eliminating sequence operation. Again, after the truck tires are cured, they are automatically expelled from the rear of the press onto a take-away conveyor.

The post-inflation of tires is also handled automatically. Post-inflators are installed at the rear of the press in such a manner that, after the tire is cured, it is automatically post-inflated before being discharged onto the take-away conveyor. With the introduction of automation it has been necessary to develop such items as automatic mold blowout, automatic air-blowing of the green tire, and automatic mold lubrication. Although these vary somewhat depending upon the installation, the systems do work very satisfactorily.

In conclusion we wish to re-emphasize that, with present equipment, there is no one type of unit to fill all requirements and a study of each particular plant or installation should be made before selecting the type of equipment required for a particular production problem.

The Role of Rubber in Materials Handling

By J. L. HAWLEY

(Goodyear Tire and Rubber Co.)

Rubber today plays an important part in materials handling and potentially has a much larger role to play in the future. All of us are familiar to a degree with some of these applications and probably have heard of the less common ones, not yet generally accepted.

Three specific uses of rubber in material handling will be discussed here: conveyor belts, pillow tanks and Rolli-Tankers, the last being Goodyear's name for a large tire filled with fluid, where fluid is the payload, and the tire serves the dual purpose of container and running gear. No doubt many other applications exist of rubber for materials handling; however, these three represent some of the more intriguing possibilities.

It is worthwhile to note at the beginning, that all these applications depend to a very large extent on currently available synthetic rubbers and fibers. If these were not available, each one of these uses would be severely restricted or, in some cases, eliminated. Conveyor belts represent a well developed rubber product, enjoying a substantial market which has grown continuously since rubber was first used for this purpose around 1870.

Modern conveyor belting dates from 1896, when the troughed roller was first introduced. This innovation served to double the carrying capacity of any one belt. A second significant development occurred in 1920, when vulcanized splices, accomplished at the installation site, were introduced. This new belt-joining technique resulted in a splice as strong as the belt itself, and greatly increased the number of possible applications.

The increase in usage of conveyor belts is a direct result of their proven capacity to move a great range of bulk materials at a lower cost than any other method of transportation. As an indication of this capacity, they move such widely diverse materials as iron ore, coal, hot cement, wheat, fruit, vegetables and mail, over distances from tens of feet to miles. In service, it is unusual for a belt handling a bulk material, such as iron ore or coal, to move less than a million tons during its life, and we have examples of belts moving up to forty million tons.

Transporting Rubber and Fibers

In order to accomplish the assigned tasks, conveyor-belt engineers employ every available type of rubber and fiber reinforcement in one version or another of their product, depending upon the material to be handled and the conditions under which it must function. The rubbers include natural, neoprene, butyl, Buna-N and styrene. The fibers are cotton, rayon, nylon, dacron and steel. If no new applications were possible, conveyor belts would still play an important part in materials handling, though we do not believe this to be true as shown by our past and continuing interest in the proposed Riverlake Conveyor System. This system is intended to move iron ore from Lake Erie to the Ohio River, and coal from the river to the lake on the return trip. Exhaustive engineering studies of this proposal have shown no unsolved technical problems, and the ready availability of private capital to finance the undertaking indicates the economic soundness of the transportation plan.

Pillow tanks for storing and transporting liquids date back to shortly after the conclusion of World War II, when the Army, searching for a means to simplify and speed up the storage and transfer of fuel, sponsored an ambitious research and development program. One of the results was the development of successful pillow tanks in a range of sizes: 900, 3,000 and 10,000 gallons. The 900-gallon tank was intended for both storage and transport, the 10,000-gallon tank representing at that time the largest feasible size. Success in this venture was predicated to a large extent on the wartime materials and technology evolved for aircraft fuel cells, but today's fuel-handling pillow tanks still make valuable use of this background.

Since that time, acceptance of pillow tanks by the Armed Forces has gradually widened to the point where they play an ever increasing part in their planning for the handling of fuel in the future. As a matter of interest, fuel is the largest single tonnage of material handled, surpassing ammunition or any other commodity by a wide margin. Currently, the Army and Marine Corps are procuring substantial quantities of pillow tanks for use in fuel-handling systems designed to meet their specific requirements of portability and quick installation.

Incidentally, all of these systems use substantial quantities of hose for filling, transferring and dispensing fuel. They include lightweight, high-performance pumps, meters, filters and dispensing equipment. The salient features that make pillow tanks a desirable item to the military people as a part of fuel handling systems are: (1) Light Weight—A Marine Corps 10,000-gallon tank in its shipping container weighs a maximum of 1,200 lb., including the fittings required to attach the filling and emptying hoses. (2) Low Cubage—This same Marine Corps tank in its container is 14 ft. x 20 in. x 18 in. (3) Ease and Speed of Operation—Select a level piece of ground, unroll the tank, make two or three connections, and you are in business. (4) Low Fuel Losses—Measured fuel losses in a 10,000-gallon tank over a period of one year averaged less than one gallon per day.

The heart of these lightweight, easily erected systems is the fuel tank. These tanks are constructed in either single or two-ply configurations, of a nitrile rubber-coated, square-woven cloth, and usually include a nylon barrier between plies or, in the case of a single-ply tank, between laminations of the coating. The fitting openings for filling and emptying are achieved with metal inserts molded into a configuration providing tapered flanges for bonding to the basic tank material. Patterning the various pieces of material to form the tank is quite simple; however, careful workmanship and design are essential in the seam areas to obtain a reliable and leak-free tank.

Pillow Tanks: Dimensions, Uses, Problems

When filled, the tank measures 40 ft. long x 10 ft. wide x 4 ft. high, the latter figure representing the head of fuel. In emergencies, it may be filled to a capacity of 12,000 gallons. The head increases to approximately 5 ft. when the tank is loaded to this volume. Comparatively recent work has made larger sizes of pillow tanks feasible. For example, we recently manufactured and delivered experimental 50,000-gallon pillow tanks to the Army, which it is evaluating. This tank, when filled to capacity, is approximately 60 ft. long, 22 ft. wide and 5.5 ft. high. Its empty weight is 2,400 lb., or 125 lb. of fuel per lb. of tank.

It would appear from the preceding that large pillow tanks for storage of fuel or other liquids are solely an item of interest to military organizations. This is not quite true, as we visualize their eventual acceptance and use wherever easily erected, inexpensive, temporary storage of liquids is required. Transport pillow tanks are another matter. Considerable commercial, as well as military, interest has already been generated, and it seems that commercial use will outweigh military. They offer the commercial carrier an inexpensive, lightweight means of converting from dry cargo to liquid cargo and back again, in the same vehicle, in a matter of minutes.

There are some obvious difficulties in utilizing this equipment and some not so obvious. The obvious difficulties are technical, and solutions are now available. The not so obvious difficulties are legal in nature involving truck-line charters and the Interstate Commerce Commission. We presume that economic considerations will eventually decide this issue, and are proceeding with the technical development work on equipment required for moving a number of liquids. In the event that the legal questions are unfavorably decided, the export market in less regulated countries will probably justify our efforts in this program.

Rolli-Tankers, the last product to be discussed, are the newest and least developed of the rubber products intended for materials handling. Even so, this work is well along for military customers, having completed

all laboratory phases and initial field-trial production is now authorized. The Rolli-Tanker presents a much more difficult technical problem to solve than the pillow tank, since, in addition to containing fuel, it must also withstand the abuses associated with tires, such as repeated flexure and shock loads.

The successful development of Rolli-Tankers involved the use of rubber materials developed for fuel tanks into what closely resembles a conventional tire design. As this work progressed, many difficulties were encountered along the way and overcome, one by one, to the point where the unit now in production has demonstrated the following capabilities: (1) It will follow any towing vehicle anywhere the vehicle will go, on or off the road and, since it floats fully loaded with fuel, this includes boats. (2) It is air transportable and can be air dropped. (3) It has excellent self-sealing characteristics under small arms fire, and it will handle any of the common hydrocarbon fuels, maintaining gum contamination within required specification limits.

Adapting Military Equipment

To date, our efforts have been expended almost exclusively in the direction of military users because they represent the greatest need and largest single market. Potential civilian and commercial uses exist in areas where for one reason or another it is difficult to move liquids, and a need to do so is apparent. The units, designated Rolling Fluid Transporters by the Army, consist of two 500-gallon capacity Rolli-Tankers, assembled on either side of a tow bar mounted just above the center of the common axle on which the tires are mounted. The tires are 64 in. in diameter, 42 in. maximum width, and have a bead diameter of 18 in.

Completed, the assembly weighs less than 2,300 lb., including all necessary equipment for filling, dispensing and transfer of fuel. It provides a standard lunette on the front of the tow bar, permitting towing behind any Army vehicle, and a pintle on the rear for attachment of additional units. Operating pressures vary depending on the type of terrain being traversed, ranging from a low of 2 to a high of 15 psi. The lower pressures apply to off-the-road use, the higher ones to over-the-highway. The final test phase completed prior to delivery of units was conducted at the Army Yuma Test Station; it was most severe and, significantly upon evaluation, resulted in a number of detail changes to the towing rigs and none to the Rolli-Tankers.

Present planning provides for a family of these units in varying sizes, in addition to the 1,000-gallon T-3 unit going into service. This planning includes a 600-gallon unit and an improved version of the present 1,000 gallon unit, both now under development.

This has been a brief discussion of three rubber products used in material handling. The first, conveyor belts, is 90 years old and has an established position in the materials handling field. The second, pillow tanks, is less than 15 years old, and its market potential is just beginning to be established. The third approach to materials handling, Rolli-Tankers, is just emerging from the laboratories, but we will soon know its potential based on performance in the field.

Question & Answer Period

Following the presentation of their papers, the six panelists at the Akron Symposium answered questions from the floor. Selected portions of the transcript are presented below, including answers by Mr. Hineline.

Q. What basic equipment is required, in terms of capital investment, for a firm instituting materials handling of about 1 million pounds of raw materials per month?

A. On the basis of 50,000 lb. of material a day, the best method for handling would be by pallets and lift trucks. Each pallet holds 2,500 lb. and costs $4. A fork lift truck with a 4,000 lb. capacity may be purchased for $7,500. Figuring on 600 pallets and 1 truck, plus a storage area 3 ft. high, handling 250 lb./sq.ft., and leaving 33 per cent for aisles and voids, we can estimate storage costs for 6,000 sq. ft. at a total investment of $9,900 per month.

Q. What type of bulk system is recommended for a plant handling 10 million lb. of carbon black of four to eight different grades annually?

A. There are several possible methods. One way would be by bulk hopper car, having separate compartments for four to eight blacks, with a capacity of 35,000 lb. each, and located above a building or on the ground with a six-compartment surge hopper and weighing equipment. This system should yield estimated savings of 0.0075¢ per pound of black handled.

An alternative would be unloading hopper cars into tote bins, either handling them en route to the floor above a Banbury mixer or emptying them into an elevator that fills six-compartment surge bins over the Banbury. Savings from this system can be estimated at 0.0065¢ per pound.

Rubber bag containers can be used, but this would require a complete study of source, shipping and black costs.

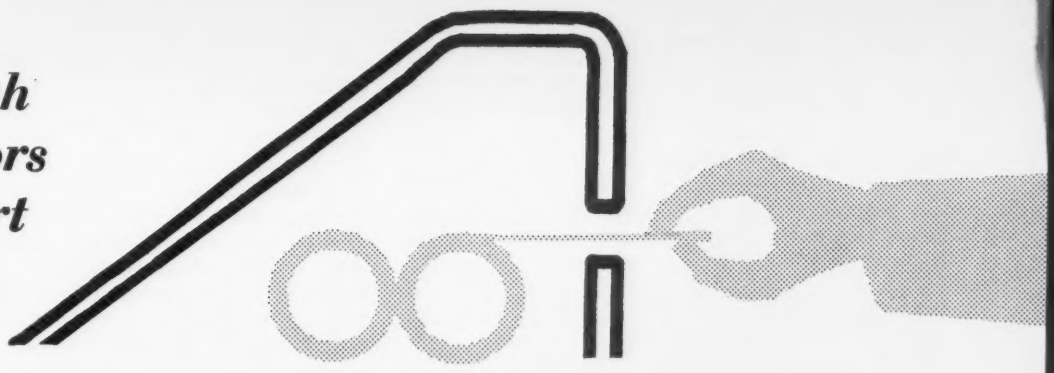
Q. What size pallets are best for raw materials storage?

A. Pallets should be 42x48 in. for sacks and drums, but 48x48 in. for crude rubber bales, eight to a pallet.

Q. What impact will mechanization have on the handling of densified or pelleted zinc oxide?

A. Zinc oxide can be handled mechanically and weighed automatically. Future methods should resemble those currently used to handle clay.

British Visitors Report on



SAFE OPERATION of LABORATORY MILLS

VISITS to rubber factories in the U. S. by staff members of the British Rubber Manufacturers' Research Association (RABRM) leave the impression that great concern is taken for the welfare of employees. This, however, does not extend to the safety of laboratory employees as far as the most dangerous machines of all, laboratory two-roll mills, are concerned. There is still widespread belief that efficiency and safety of such mills are incompatible objectives.

This point of view is indefensible. Several years of experience with efficient and safe working laboratory mills has been gained in England and the U. S., including those in the RABRM laboratories. It is our duty to publicize widely the modifications making mills safe in order to encourage operation of only accident-proof mills. It is not too emphatic to state that accidents with laboratory mills are the moral, if not the legal responsibility of senior staff and management who neglect to adopt these, or other well-tried, precautionary measures.

In the opinion of a leading authority on mill safety, R. W. Lunn *(1)*, safe operation should not rely on skill or experience. Accidents generally result from momentary lapses of attention or of technique. Therefore, the object is to make the mill safe for the operator no matter how inexperienced, unskilled, fatigued, or indeed foolish he may at any time be. The only consideration should be whether a mill is safe and foolproof, while at the same time easy to use.

Proper safety measures must, further, not rely on any conscious action such as reaching for a safety bar or switch, or on an only probable involuntary action, such as pressing the knee towards the machine. Anyone who has experienced getting his hand nipped in a mill knows full well that the immediate reaction is a desperate attempt to pull it away. Safe working reduces simply to making it impossible for an operator, under any circumstances, to get his hand in the vicinity of the nip between the rolls when these are moving. The rolls rotate a certain distance after activation of a brake and, consequently, the brake must be activated before the hand reaches the braking distance from the nip.

It is useless to even think of a guard for a mill unless the machine has excellent braking characteristics. Should this not be so, then steps must be taken to improve it. While it is impossible to cover every case, one or more of the following five methods are recommended:

Five Suggested Improvements

¶ For A.-C. Motors—(1) Plugging, i.e., reversing the electrical connections to any two of the three phases to the motor stator. This is generally usable up to 7½ h.p. motor started "Direct on Line." Where Star-Delta start is used on larger motors, "Reverse Star Plug" connections may be made for braking. A dynamic switch driven from the highest speed shaft should be used to break the holding circuit of the reverse contactor when the motor is brought to rest, in order to prevent reverse running of the mill.

¶ (2) D.C. braking: Electrical braking is achieved by breaking the three-phase supply to the motor and connecting the stator to a D.-C. supply which gives a stationary field. This method assumes a suitable D.-C. supply available, but does not call for excessive A.-C. current. Means must also be incorporated to break the D.-C. supply when the motor is stationary, to prevent overheating.

¶ For D.-C. Motors—Rheostatic or plug braking may be used on D.-C. motors.

¶ For all motors—(1) Electro-mechanical braking should be capable of applying, as a minimum, a braking torque equal to the full load torque of the motor.

¶ (2) Use of an electro-magnetic clutch and brake: When the inertia available is excessive, or if two or more mills are driven from the same motor, a combined clutch and brake may be used to disconnect the mill from the excess inertia (motor, gears, other mills, etc.), while applying the brake to the tripped mill only. With an efficiently guarded machine, operators will accept the underside of the rolls to be perfectly safe, hence reverse rotation of the rolls must never be allowed to take place, and any "inch" button fitted to a mill must give "inch forward" only.

The guard we describe is a development of that originally proposed by Poynton *(2)* and improved by Lunn and Stopforth *(3)*. A photograph of the guard on a 6-inch mill is shown in Figure 1, and a diagrammatic representation in Figure 2. The metal selected is a matter of convenience, as long as obvious rubber contaminants such as copper are avoided. The guards at RABRM are of cadmium-plated mild steel, but in the U. S. relative cost makes stainless steel probably preferable. In the diagram, "G" are rectangular metal gates hinged at "H" to hang radially on the rolls. At their lower edges the gates carry simple tubular rollers "R" to reduce the friction of materials riding on the gates under normal working conditions, and to prevent scraping of a hand drawn under the gate before the rolls stop.

The 6-pound weight "W" requires this force to be applied before the gate moves, lifting "W" the ½ inch to bring in the braking mechanism through switch "S". The gate is, therefore, not too sensitive to material riding on it, thus causing no injury even if it causes a not particularly pleasurable experience during emergency operation. The gap between gates and rolls of 1 inch provides for knuckle control, the radial hanging angle assuring an ever increasing gap in its upward movement. The distance from "A" of a ¾-inch gap between rolls to "B" where the roll stops on actuation of the gate switch at "B′" is 5 inches, allowing for the longest finger-length of operators so far encountered.

The letter-box cage "C" allows the operator easily to reach the top inside the cage with raw rubber or rolled up stock for refining, and to drop it on the nip through a gate of 8 x 4 inches. The dimension "L-L′" of 9½ inches and length of 8 inches ensures that only half of the forearm can be introduced. The elbow joint cannot, therefore, be used to enable reaching down to the nip. Compounding ingredients are added close to the rolling bank through the slot "T," fitted if desired with a short chute. The small gap at the back of the letter box provides for rubber being dropped in the nip after removal from the back roll. The open structure of the guard makes mixing operations readily visible, and cleaning with a brush or vacuum an easy matter.

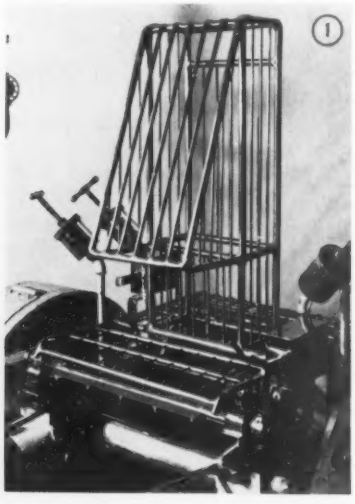
Some mixes tend to go round the back roll, and are difficult to remove. A scraper shown in Figure 3 has been designed for use with this fully guarded mill. Blades of various width can be fitted to the scraper which rides on a ⅞-inch diameter bar supported across the side-frames of the mill. A scraper of full roll width could, if desired, be arranged to act on this bar, but in practice is found to be less convenient. Should the scraper become dislodged from the rider bar (although this has not been experienced during 4 years of use), it will only travel around with the roll, strike the safety gate and apply the emergency stop. Batches of up to 1,000 grams are easily processed on this machine.

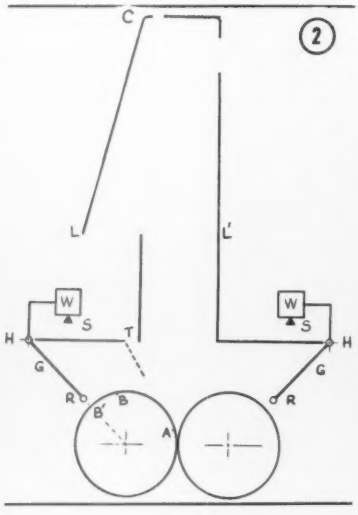
Figure 4 shows the same guard system being used on a 17¾ x 8 inch mill used regularly for carbon black compounding. The "letter-box" was in this case constructed of sheet steel instead of a round steel bar and the trunking of a dust extractor was fitted to its top. A chute, 3¾ x 2¼ inches, tapering to 1½ x 2½ inches, terminating above the approximate center of the front roll, enables fillers to be fed into the mix with no serious loss by extraction. While batches of 7,500 grams have been mixed on this mill, common batch sizes are 5,000 to 6,000 grams.

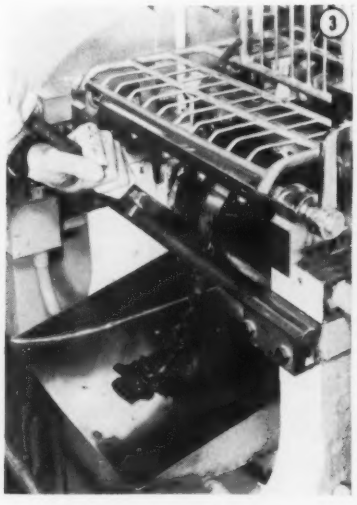
Special Considerations for Small Mills

A mill of roll diameter less than 6 inches is progressively less workable when fitted with a guard of the above description with its safety distance "AB" (Fig. 2) of 5 inches. For a 2-inch diameter roll mill at RABRM, a differently designed guard is in satisfactory use. This is illustrated in the open and closed position in Figure 5 and 6, respectively, and diagrammatically in Figure 7.

Essentially, the guard is an inverted U-shaped piece of clear plastic such as Plexiglass 3/16 inch thick, with a 1¾ inch diameter hole in the top for admittance of ingredients at conveniently greater than







finger-length from the nip. The piece of Plexiglass is mounted on ⅜ inch-thick steel end-pieces, which also provide the hold-down weight. To the end-pieces are fitted double hinges in the fashion of a double swing door. These permit the guard to swing open either from the front or rear onto stops, as well as to retain it in an open position for cleaning or adjustment.

Fingertip control is obtained by bringing the rounded edge of the Plexiglass to within ½ inch of the rolls. Lifting the guard by the fingertips releases the switch applying the brake. The guard does not interfere with normal mixing, including use of the standard scraper on either roll, and reduces the loss of powders by drafts above the rolls. Batch sizes on this machine vary from 5 to 50 grams.

Laboratory mill guards have been in operation at RABRM for five years. To begin with, operators regarded them with a natural conservatism as restricting their freedom, if not their safety. Soon, however, it was found that all the traditional operations of mixing could be conducted with no impediment, indeed more systematically. The Research Association has naturally to deal with a range of materials at least as varied as any factory's with a sequence of young operatives during their training. Under these stringent test conditions, the mill guards have proved consistently satisfactory in maintaining both an unblemished safety record and an undiminished level of productivity. The new generation of mill operators is accustomed only to safe mills and no longer tolerates dangerous mills. This attitude, we feel, is the right one for all concerned.

The Research Association has been called on, in a number of occasions, to advise on mill safety. Only too frequently, the stimulus has been an accident and not thought of its prevention. The Association, located at Shawbury, Shrewsbury (Shropshire), England, will be pleased to help any firm which wishes assistance.

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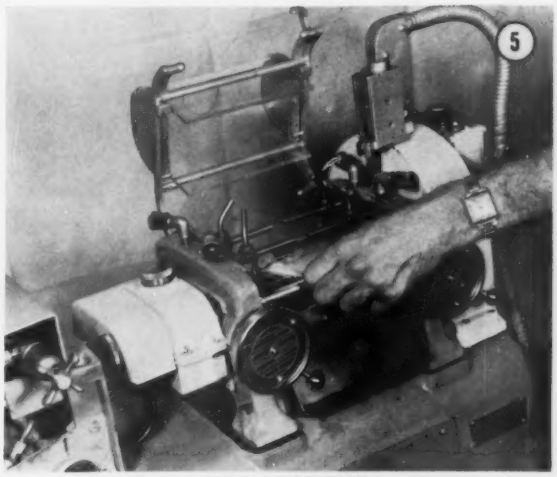
Tried and True Devices for Accident Prevention



▲ OPEN POSITION

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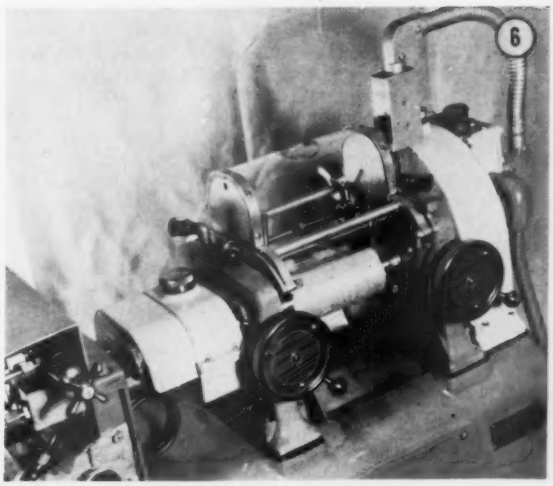
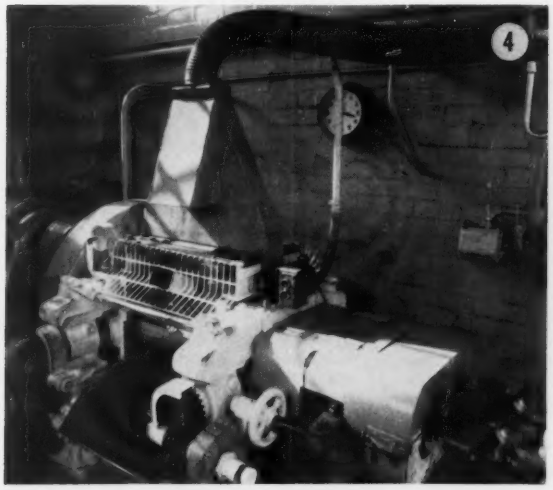
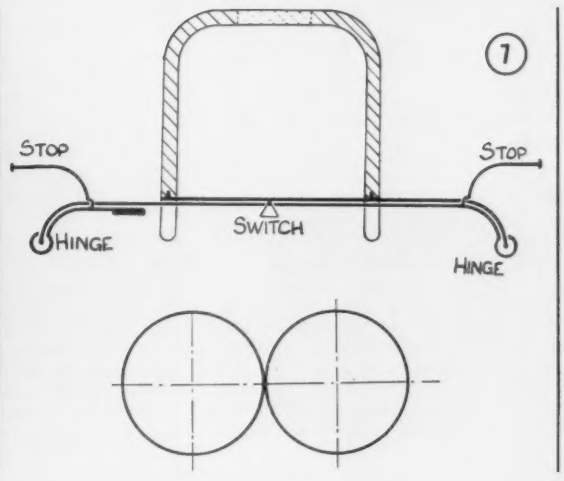






An Exclusive Press Conference on the Rubber Industry's Stake in

Auto Fleets

► Almost exactly one third of the passenger automobiles used by rubber producing firms at present are company owned, while the remainder are rented under leasing arrangements or salesman-owned. Each method has its peculiar advantages for the user. In order to help rubber manufacturers make the best possible choice to suit their particular requirements, RUBBER AGE asked six crucial questions of A. J. Schoen, president of a rental agency with a number of prominent clients among rubber manufacturers.

The answers given by Mr. Schoen present a frank account of benefits and drawbacks for the potential auto leaseholder, discussing the various rental plans available and their relative attractiveness in terms of cost and service. Readers who would like further information on their special leasing problems should contact Mr. Schoen at Wheels, Inc., Chicago 45, Ill. Herewith, the basic questions and answers with detailed facts on the present state of auto fleet leasing, including figures taken from actual "case histories."

How much auto fleet leasing is being done by the rubber industry?

At the end of July, 1959, there were 240,000 cars in leased auto fleets used by all industry. Of that number, about 3,500 were leased auto fleets used by rubber manufacturing companies for their salesmen. Another 3,400 cars in the industry were company-owned, while 3,900 were owned by individual rubber products salesmen and used for company business.

In the rubber industry, there are two major reasons why firms like the B. F. Goodrich Company lease auto fleets for their salesmen. First, is the need to preserve liquid capital in the business; the typical rubber manufacturer has a current ratio of about 2.9-to-1. This would normally be adequate, except that the same typical manufacturer has fixed assets equal to one-half his net worth, and an inventory representing 60 per cent of his working capital. This means that every cent in the business is working overtime. As a result, holding on to liquid cash is a "must" for most rubber products manufacturers. Leasing of company car fleets is one way in which this can be done. Using salesman-owned cars is another way.

Second, many rubber products manufacturers have found that a leased fleet presents fewer headaches in supervision, operation and sale of used cars, than does a company fleet. In addition, depending on annual mileage and allowances, a leased car fleet is usually (but not always) cheaper to operate than salesman-owned cars, and generally more efficient.

What types of autos are leased?

All types. Most leased auto fleets are low-priced cars for salesmen, higher priced for executives. Some companies lease station wagons. There is no restriction as to make, model or optional equipment.

Why has auto fleet leasing grown so rapidly?

Auto fleet leasing came into the picture before World War II. Giant rubber companies found that they could use their own capital to better advantage in production; so, instead of buying their auto fleets, they leased them. After the war, medium-sized and smaller companies found the same advantage held for them. What, precisely, is this advantage?

If a rubber manufacturer buys an auto fleet costing $100,000, he takes this money out of his working capital. If this company earns profit on its working capital (for example, at the rate of 40 per cent before taxes), then the company would be sacrificing these profits by freezing the capital in fixed assets such as an auto fleet. However, by leasing its fleet instead of buying one, and leaving its working capital in the business, this company would be far ahead in net profits after taxes at the end of the leased period.

In the rubber industry, the average before tax net profit on net working capital is 40 per cent—before Uncle Sam takes his slice. In other words, the "cost" of purchasing a fleet with a rubber company's own capital would be (on the average) 40 per cent of the amount invested in autos per year.

On a $100,000 fleet, that "cost" would be $40,000 the first year, less the second year because of depreciation. That $40,000 is the amount of net profit before taxes, which a rubber products company would forego, if it pulled $100,000 out of current operations and froze the cash in fixed assets. This sum is part of the true cost of company-owned auto fleet operation.

If you compare earnings of two rubber manufacturers of the same size and sales volume—one company using a leased fleet of, say, 100 cars on two-year lease, the other using a company-owned fleet of 100 cars—the company with a leased fleet would be about $95,000 ahead of the second company using a company-owned fleet. This

"IS LEASING THE BEST WAY?"

. . . For some rubber manufacturers YES, for others NO. . . . A candid analysis of the pros and cons is presented in this interview with a working specialist in the field, A. J. Schoen.

$95,000 would be cumulative *after-tax* earnings at the end of two years.

An objective analysis of the different methods of fleet acquisition has been developed by the Foundation for Management Research. It is entitled "Advantages and Disadvantages of Auto Fleet Leasing: A Comparison of Company Ownership, Salesman Ownership, and Leasing." Single copies may be obtained free from the Foundation at 121 West Adams St., Chicago 3, Ill.

How does auto fleet leasing work?

There are two basic types of auto fleet leasing plans: the finance (equipment trust) lease and the maintenance (fixed-cost) lease.

The finance lease: In this plan, Wheels, Inc., for example, provides the auto fleet at low fleet prices, delivers them to the salesmen in their home territories, and sells the fleet at the end of the (normally two-year) lease period. For these services, the leasing company charges a monthly fee. To this is added a monthly charge (2% of original cost) for depreciation. All costs of maintenance are borne by the user. In short, the finance lease gives the company a brand-new fleet of cars but leaves it the job of selling the used cars.

However, one of the intangible benefits of this plan is the guidance of the leasing company regarding the best type of cars to use for a particular company's business, and the best time of the year to dispose of the used cars. Where the leasing company is an established, national concern, it can dispose of used fleets in different used car markets throughout the country. At any given day, prices for a given model may be higher in one city than another. A national leasing company keeps abreast of such price fluctuations in order to get the best prices for its clients' used car fleets.

The maintenance lease: In this plan, the leasing company not only provides the new fleet, but takes over the whole expense of fleet operations, except for daily gas and oil costs. This includes buying the fleet, delivering it to salesmen in their home territories, all repairs and maintenance work, insurance, licenses, taxes, tires, and selling the fleet after the rental period. The leasing company also bears all risks of depreciation. For this whole package, the leasing company charges a flat monthly fee covering fleet acquisition, maintenance, depreciation, etc. The user has a fixed cost, and knows exactly what his fleet operating costs will be. The user is out of the automobile business.

How does leasing compare with company ownership of auto fleets?

Company-owned auto fleets have been declining since the end of World War II. On the average, only 25 per cent of the autos used by industry are in company-owned fleets. In terms of cost, data for most company-owned fleets show an **apparent** lower cost per mile than figures on leased fleets. This is misleading, since companies conveniently overlook the cost of their own capital invested in their fleets. The cost of capital **is** included in charges made by a leasing company.

As has been pointed out above, companies can estimate the cost of using their own capital for purchasing a fleet by examining the rate of profit they earn on working capital in their own businesses. This is what they must pay for use of company capital, when they sink it into an auto fleet. There is no mystery about this. It is this realization which is partly responsible for the steady decline of company-owned auto fleets and the continuous growth of leased fleets.

When is leasing NOT advantageous to a company?

A company, which has more short-term and long-term capital than it can profitably use in its direct business operations, will not find leasing advantageous. After all, why pay a leasing company for use of capital, if the user has spare capital of his own? Occasionally, even such a company will go in for leasing, merely because it relieves company executives of the administrative burdens of buying and selling cars and, possibly, fleet management. The company may find that, by leasing, lower prices may be obtained on new cars and higher ones on used cars. But if these latter considerations are of no importance, or if the user can accomplish those ends by other means, and if working capital is no problem, there is no point to leasing.

A company which pays its salesmen by commission only—without direct reimbursement for the use of their cars—will not find leasing advantageous. However, it is a mistake to think that, since the salesman pays for the car out of his pocket, the company has none of the burden. True, the company does not have to lay out capital to buy a car for the salesman, but it does have to pay a commission large enough to cover operating costs. The fact that some companies attempt to pay less than actual costs explains the high labor turnover among their salesmen. This, in turn, increases costs of training new salesmen. If this is insignificant, the company should stick to salesman-owned cars.

Companies, whose salesmen average 1,000 miles per month or less in auto travel, primarily in cities, find it advantageous to reimburse their salesmen on a cents-per-mile basis—but only if the rate is under 10 cents, and the company is indifferent to what the salesmen's cars look like. Where this is unimportant to them, and the total cost to the company is under 10 cents per mile, they should continue to use salesmen's cars. The Foundation report, mentioned earlier, has some interesting tables on this subject.

SPECIAL INDUSTRY REPORT

EDITORIAL

Where Do We Stand?

► *Business Week* points out that in 1959 the rubber industry spent a total of $190 million in capital expenditures and estimates that this figure will rise to $266 million in 1960, an increase of 40 per cent. Preliminary plans for 1961, 1962 and 1963 reveal that the rubber industry will invest $245 million, $198 million and $188 million, respectively, for all capital expenditures. **Where is this money going?** In 1959, 37 per cent of all capital expenditures in the rubber industry went for expansion and the remaining 63 per cent went for replacement and modernization. In 1960, it is believed that some 44 per cent will go for expansion and 56 per cent for replacement and modernization.

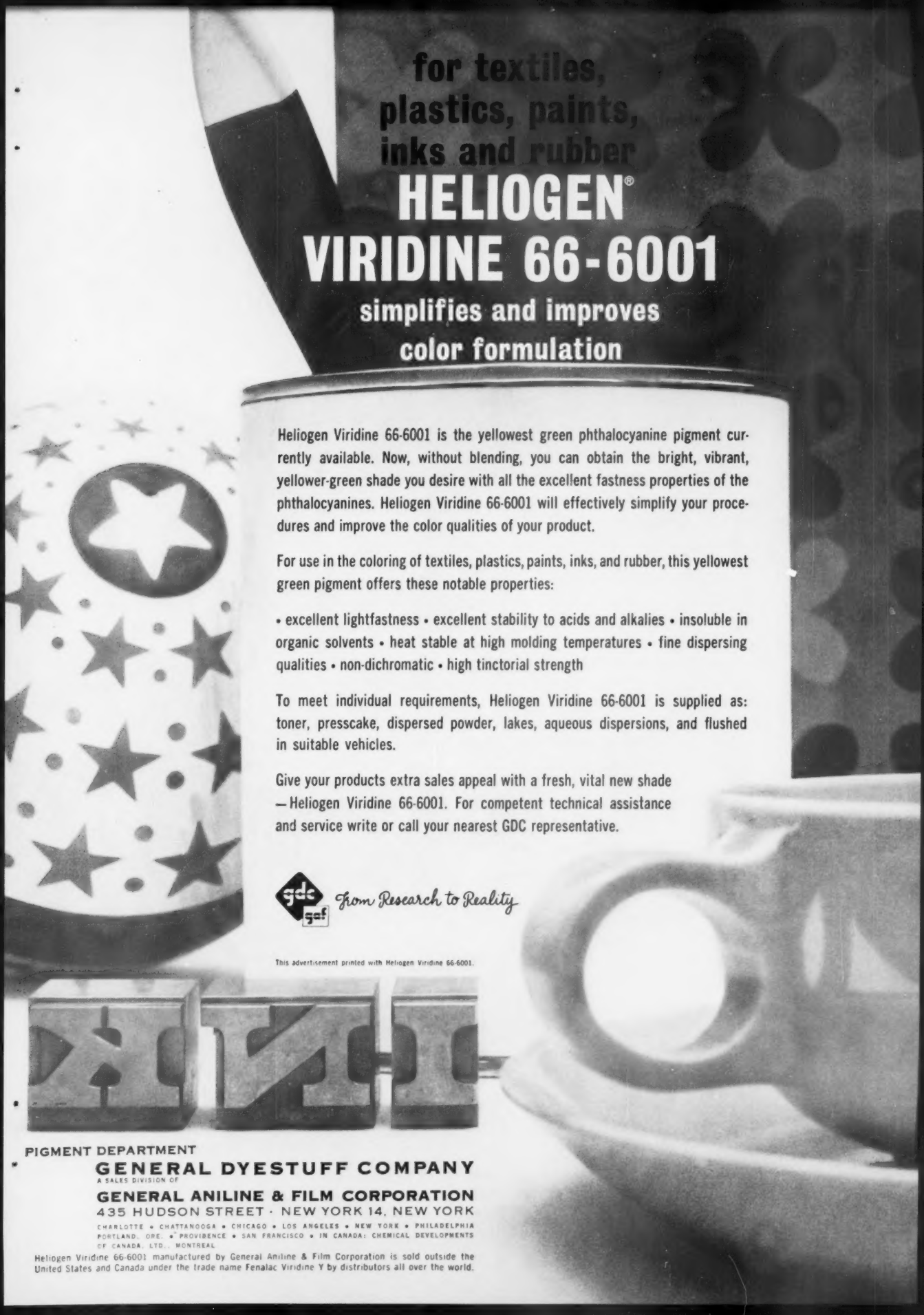
1960 spending plans by the rubber industry can be broken down still further. Of all the money expected to be spent by the rubber industry in 1960, some 10 per cent will go into buildings—90 per cent to machinery and equipment. Only the automobile and the electrical utility industries are in similar positions. About 8 per cent of the automobile industry's expenditures in 1960 will be for buildings—the rest for new machinery and equipment. The electrical utility industry will spend 9 per cent for buildings and 91 per cent for machinery and equipment.

What about research expenditures? In 1959, the rubber industry spent $89.3 million for research. In 1960 it will spend $95.6 million. In 1963, it is estimated that the industry will spend $111.9 million.

Operating from the figures set down here, one could draw all sorts of conclusions. Our industry obviously spends more for replacement and modernization that it does for buildings. Our industry will also be spending more each succeeding year for research.

What conclusions can be drawn? The rubber industry is keeping pace with all industry in almost all categories of capital expenditures, and better than most in some. Trends can be seen for all industry in that less money is being spent for physical expansion and more for modernization and replacement. Automation is beginning to make inroads in spending plans. Labor costs are apparently bearing greater influence upon present and future thinking.

Where do we stand? Industry plans would indicate planned progress at a carefully calculated rate. We will be expanding, but most of the expansion will come as a consequence of modernization, replacement and automation. We will be doing more in the way of research. By the close of 1963, it would seem, an era will have ended, and we can surely expect moves in new and perhaps different directions. **We are on firm ground.**



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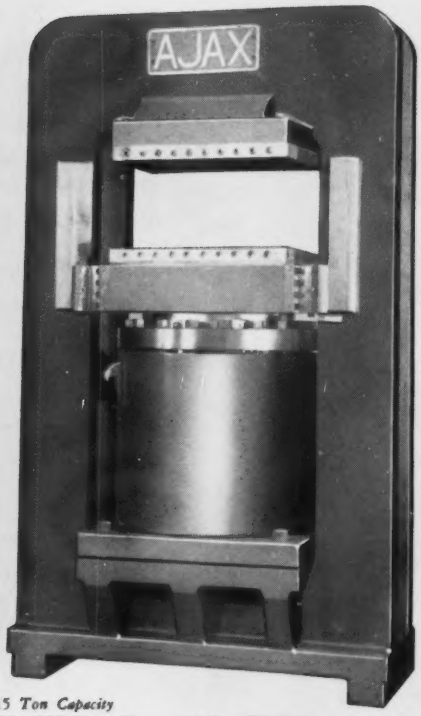

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ACS Rubber Division Holds 77th Meeting in Buffalo

► The 77th meeting of the Division of Rubber Chemistry of the American Chemical Society, held at the Statler-Hilton Hotel in Buffalo, N. Y., on May 4, 5 and 6, attracted some 1100 persons who gathered to hear 16 regular technical papers, two invited papers, and the Charles Goodyear Medal Lecture.

The papers presented at the meeting covered a full range of topics including a new fluorine-containing rubber that has an outstanding resistance to heat; new weather-resistant outdoor paints based on rubber, and a new tire material that improves wear and reduces rolling friction. Other papers included such subjects as viscosity control in butyl latex; the effect of amine structure on properties of cured polyurethanes, and oxidants and reductions at the carbon black particle surface.

Mark Addresses Meeting

The meeting got under way on Wednesday afternoon, May 4, with W. J. Sparks (Esso Research), chairman of the Rubber Division, presiding. Dr. Sparks introduced Professor Herman F. Mark of the Polytechnic Institute of Brooklyn. Professor Mark chose as his subject "Latest Advances and Break-Throughs in the Chemistry of Polymers and Polymerizations."

Professor Mark, in his invited paper, stated that one recent event of great importance for the synthesis of new polymers and copolymers was the discovery of coordinated complex catalysts in vinyl-type addition polymerization. It led to the

Herman F. Mark

synthesis of copolymers of the simplest olefins, such as ethylene, propylene and butylene, and to the preparation of high *cis*- and high *trans*-polydienes, all of which proved to be of considerable interest in rubber chemistry and technology.

Another fact of equal importance, stated the speaker, was the recognition of the importance of keeping low temperature anionic or cationic polymerization reactions completely free of water. The first spectacular result of this knowledge was the preparation of high molecular weight formaldehyde, which represents a hard and tough resin of excellent molding characteristics. Professor Mark observed that it appears that this same principle will lead to many other interesting polymers and copolymers of aldehydes, ketones and epoxides, some of which are rubbery and represent an interesting combination of properties for practical application in the field of elastomers.

Following Professor Mark's paper, the regular technical session was held for the balance of the afternoon. The following morning the second technical session was held under the chairmanship of W. S. Coe (U. S. Rubber), vice-chairman of the Division. Abstracts of all the technical papers presented at the meeting appeared in the April, 1960, issue of RUBBER AGE.

At 11:00 A.M. on Thursday morning, May 5, the Business Meeting of the Group was held with Dr. Sparks presiding. A moment of silence was observed by all present for those Rubber Division members who had passed away since the last meeting, including: W. Stewart Gocher, William McGee, R. H. Rogers, Jr., J. A. Scellen and Henry Clapp. The necrology was read by Louis H. Howland (U. S. Rubber), assistant secretary of the Division.

Emeritus Members

Chairman Sparks then announced that the following individuals had been named emeritus members of the Rubber Division: G. L. Allison, G. H. Brittain, Seward Byam, R. D. Gartrell, C. D. Kennedy and Fred Marchionna.

George Popp (Phillips Chemical), treasurer of the organization, reported that since 1958 the Rubber Division had sustained a deficit of $40,000. By 1962, he said, the Division will be "in the black." Mr. Popp revealed that the current membership of the Division, both

Dr. Sparks (left) greets invited speaker Professor Peter J. Debye

domestic and foreign, represented an all-time high.

Chairman Sparks then introduced Dr. William B. Wiegand (Columbian Carbon—retired), who delivered the Goodyear Medal Lecture. Dr. Wiegand spoke on "Determinants in Research." A complete biography of the 1960 Goodyear Medalist appeared in the December, 1959, issue of this journal.

In essence, the speaker listed these factors as contributing to research success: (1) The teammates; (2) Resourcefulness; (3) Trend lines; (4) Inversion; (5) Hunches, and (6) Contacts. These factors plus action will result in successful research activity.

The speaker stated that hunches and personal contacts are two of the most important factors in research. Hunches — "which women use automatically"—seem to be independent of formal training. They are not found in college curricula. Even job application forms do not ask, "What is your record of successful hunches?" said Dr. Wiegand. A good huncher will enrich any research team, and a brilliant hunch may lie close to a real stroke of genius, he said.

A researcher is the better for contact or exposure to the disciplines and insights of arts and sciences outside his own specialty, Dr. Wiegand observed. Such encounters, whether with pure scientists, poets, or scholars, will widen horizons, stir imagination and aid the incubation of research thinking.

"We are perhaps inclined to overrate curricula and under-rate the importance of personal exposure to teachers who possess and can communicate the imagination, the sweep and scope which we associate with greatness," he noted.

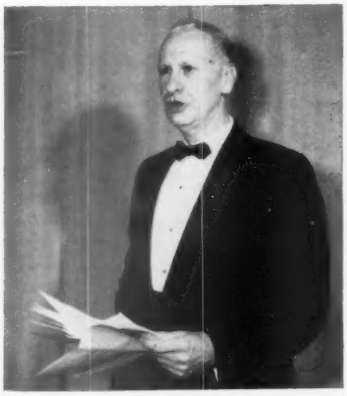
"The relatively high incidence of hunches and contacts as decisive factors in research emerges as perhaps the highlight of this modest study," the medalist commented. "But how are these non-intellectual determinants fostered? How do certain individuals acquire the spark which seems to kindle their creativity?

"In classical Greece kings and potentates sent their sons to one of two schools, not to learn certain skills, but to be exposed to two men —Plato and Isocrates. They counted on contact with these great teachers to inspire their sons, and they rated this inspiration above instruction.

"The attributes belong to the essence, the spirit of man, and research is assuredly an affair, not only of the mind, but also of the spirit, which alone can fire and inspire each of our determinants of research. This spark, this contagion, cannot be learned or taught—it has to be caught."

The third technical session, held on Thursday afternoon, May 5, was chaired by E. H. Krismann (DuPont), past-chairman of the Division. Activities on Thursday evening commenced with a suppliers' cocktail party and this was followed by the divisional banquet. A feature of the banquet was the presentation of the Charles Goodyear Medal to Dr. Wiegand. Chairman Sparks presided at the banquet and introduced John N. Street (Firestone), who offered some details as to the background of the 1960 Goodyear Medalist.

Mr. Street stated that tribute should be paid the medalist on three specific points. First, as a leader in advancing the technology of carbon blacks; second, as one of a small group in the early history of the industry whose efforts above and beyond the call of assigned duties convinced the industry of the values of technical efforts and of research; and third, as one of a group whose efforts carried the Rubber Division over the rough spots in its early history.



John N. Street

Dr. Wiegand (left) receives the Goodyear Medal from Dr. Sparks (right) as past-chairman Krismann looks on.

Following the presentation of the Goodyear Medal, scroll and honorarium to Dr. Wiegand by Chairman Sparks, members and guests witnessed a program of entertainment.

On Friday morning, May 6, the fourth and final technical session was held under the chairmanship of L. J. Halpin (Dunlop Rubber). The morning's activities got under way with the second invited paper, this one by Peter J. Debye of Cornell University. Professor Debye, a Nobel Prize winner, spoke on "Latest Advances and Break-Throughs in the Physics of Polymers."

The invited speaker noted that it has recently been shown that the angular dissymmetry of light scattering by mixtures in the vicinity of their critical mixing point can be interpreted and used to measure the range of molecular forces. This, he stated, is remarkable, since this means that lengths of the order of 10Å are measured by using visible light that has a wavelength of 5000Å. The more details of the angular density curve that can be observed, the more can be said about details of the molecular interaction as a function of the distance of interacting molecules.

A very promising subject for such measurements are solutions of polymers of the coiling type, which should begin to interact at relatively large distances. From the angular dissymmetry observed in diluted solutions, the coil dimensions can be derived; from a similar dissymmetry observed near the critical point the range of the molecular interaction between such coils follows.

Professor Debye recalled that a few months ago it could be shown

Dr. Winkelmann (left) speaks with Gordon Holmes who won an award as 25-Year Club member with most years' service in the rubber industry.

that critical dissymmetry really exists for solutions of polystyrene in cyclohexane. He went on to discuss the results concerning the mutual interaction of such polymers which can be derived from recent measurements of that kind of polystyrene samples covering a range of molecular weights.

During the course of the meeting, George Popp (Phillips Chemical), treasurer of the Rubber Division, presented a check in the amount of $2,000 to R. Warren, chairman of the Membership Committee of the American Chemical Society. The check was presented on behalf of the Rubber Division to the ACS Building Fund.

25-Year Club Luncheon

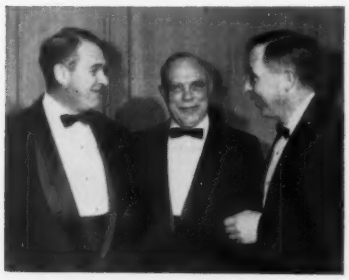
The 25-Year Club Luncheon was held starting with a cocktail hour at 11:30 A.M. on Wednesday, May 4. Cocktails were provided through the courtesy of the suppliers. Chester H. Peterson (U. S. Rubber Reclaiming) presided over the luncheon. Mr. Peterson first asked that a moment of silence be observed for those members who had passed away since the last meeting, including: W. Stewart Gocher, William McGee, R. H. Rogers, Jr., J. A. Scellen and Henry Clapp.

Mr. Peterson then introduced new members of the Club: Ted Argue (Roth Rubber), C. G. Smith (Firestone), Emmett Reinhold (General Tire), Jack Rines (Pitt Consol), Don Bradley (Commercial Chemical), Dan Shobin (Witco) and M. E. Davis (National Kaolin). 25-Year Club pins will be furnished to the new members upon request through the courtesy of Godfrey L. Cabot, Inc., 125 High Street, Boston 10, Mass.

Next came the selection of the member present with the most years service in the rubber industry. The honor went to Gordon Holmes (St. Lawrence Chemical), who has been active in the industry for more than 49 years. One hundred and fifty members of the Club were in attendance at the meeting. The next gathering of the 25-Year Club will take place at the Fall Meeting in New York City. John Ball (Midwest Rubber Reclaiming), will preside.

L. J. Halpin (left) chaired the Arrangements Committee while C. H. Peterson presided at the 25-Year Club luncheon.

Arrangements for the Spring Meeting were handled by the Local Arrangements Committee, headed by L. J. Halpin (Dunlop) as chairman and E. J. Haas (Dunlop) as co-chairman. Other committee chairmen and their assignments included: *25-Year Club,* C. H. Peterson (U. S. Rubber Reclaiming); *Ladies' Entertainment,* W. J. Fritton (U. S. Rubber Reclaiming); *Publicity and Printing,* R. J. Herdlein (Hewitt-Robins); *Banquet,* D. E. Jones (U.S. Rubber Reclaiming); *Housing,* R. J. Kirwan; *Registration and Information,* E. R. Martin (Dunlop); *Banquet Ticket Sales,* F. M. O'Connor (Linde); *Finance,* R. E. Schutz (Buffalo Weaving); *Meeting Rooms,* C. W. Wahl (Hewitt-Robins).



Rubber Division officers seen conversing at the banquet: George Popp (treasurer), Louis Howland (assistant scretary) and W. S. Coe (vice-chairman).

Northeastern Section Hears Adhesive Paper

► "Current Topics in Rubber-to-Metal Bonding," was the subject of a paper given by Stewart L. Brams (Dayton Chemical Products Laboratories) during the April 19 meeting of the Elastomer & Plastics Group, Northeastern Section, ACS, at Morse Auditorium, Museum of Science, Boston, Mass. Seventy persons attended the meeting and heard Mr. Brams discuss the present state of the art and recent developments in metal preparation, testing, and general cement systems in use.

Mr. Brams stated that pre-baking as a means of controlling mold dirtying and cement film flow is definitely advantageous with certain cements which were tested. In addition, stock formulation is an important factor, both regarding adhesion and the effect of stock flow on cement film, movement of film, and dirtying of mold. One general conclusion drawn by the speaker was that good adhesion practice requires the matching of cement and stock for each specific instance cited.

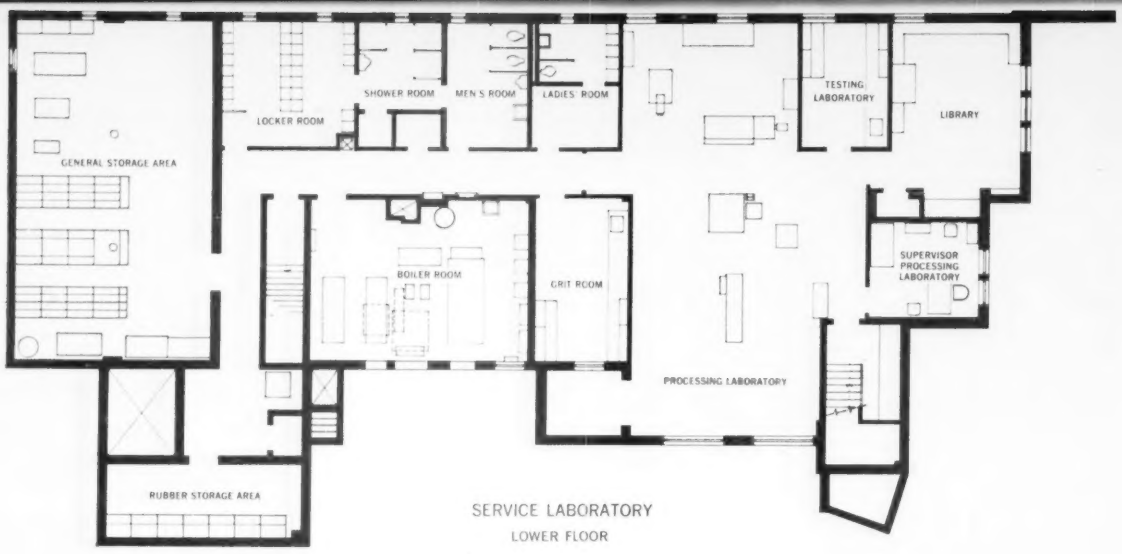
Connecticut Dance

► The Connecticut Rubber Group held its first dinner dance on April 30 at the Sanford Barn East in Hamden, Conn. Attendance of over fifty couples assured success of the event and, in the opinion of Group officers, would make scheduling of this semi-formal an annual affair.

Following a suppliers' cocktail party, lobster and roast beef was served at dinner. Sal Libro's orchestra then supplied dance music. The program was arranged by a dance committee which included Frank B. Smith (Naugatuck) as chairman, Carl Larson (Wyrough and Loser) in charge of tickets, and F. H. H. Browning (Cabot) heading the suppliers committee.

Elected President

► Julian S. Weinstein has been elected president of the Randolph Machine Company, Inc., Randolph, Mass., and will continue as director of purchases of the company. With a background of over 20 years in the combined leather and rubber footwear field, Mr. Weinstein will direct company expansion with emphasis on direct molded vulcanized shoemaking.



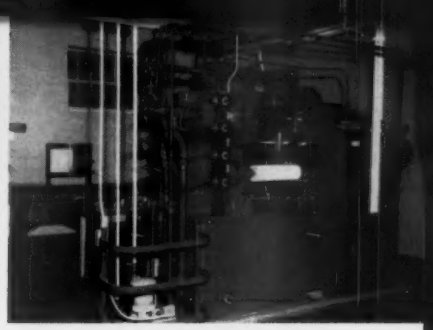
United Carbon Opens New Akron Service Laboratory

► United Carbon Co., Inc., recently opened its new Akron, Ohio, Service Laboratory. The modern two-story facility is equipped with instrumented mixing equipment, and the latest commercial processing equipment as well as a broad range of physical and analytical testing devices. "Today's technological advances are occurring at such a rate," said R. W. French, United Carbon Co. president, "that a raw material manufacturer must constantly analyze end-product requirements and process improvements to know what will be required in his products tomorrow." The lab is staffed by United's long term carbon black specialists and by a group of newly recruited men with extensive commercial rubber production experience. Plans to expand this group of production specialists to cover all industries utilizing United's products indicate the broad scope the product and process evaluation programs are to cover. Practical interpretation of data both for customer use and for product improvement programs is the major goal of this new service facility.

"Ultimately, we expect to be able to simulate the commercial conditions which surround all the uses of United's products," stated Frank Holmes, manager of the new Service Laboratory. "By such a process we shall, through our highly instrumented processing equipment and extensive testing procedures, be able to evaluate product reaction at every step. Once such a history is established, the second phase—product modification for higher throughput and improved end performance—will be more easily developed," he continued. "It is our basic position that the proper balance of manufacturing variables — raw material properties, compounding, process requirements and end-product specifications—will result in faster, more efficient throughput of quality products. In our estimation, this is one of the last major areas in which industrial economics can be effected. Quality end-products produced by faster throughput at lower processing cost (e.g. power) is the ultimate goal," stated Mr. Holmes. United estimated it would cost approximately $750,000 to duplicate a facility with the equipment found in this complete and modern installation.

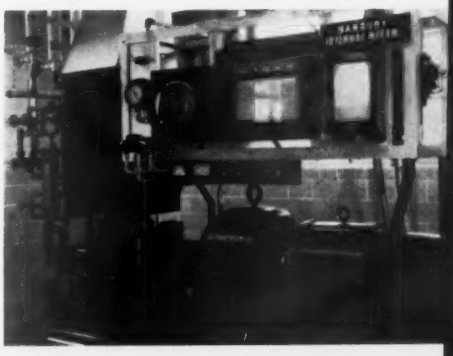
United Carbon Company's new $750,000 Service Laboratory at Akron, Ohio. The modern two-story building houses a complete range of mixing and commercial processing equipment.

The Lewis Injection Molding Machine is one of the unique units in the Processing Laboratory. A 40-second cycle for cure time can be obtained as against the conventional 40 minutes.



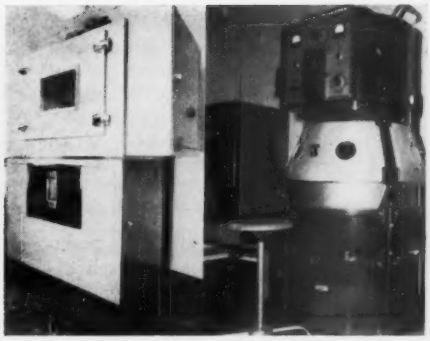
A four-roll inverted "L" calender is another of the units in the Processing Laboratory which also includes a two-roll mill, an extruder, a tensile tester and a Weather-O-Meter.

The Chemical Laboratory provides the company with quantitative and qualitative information related to experimental and commercial blacks and rubber compounds.

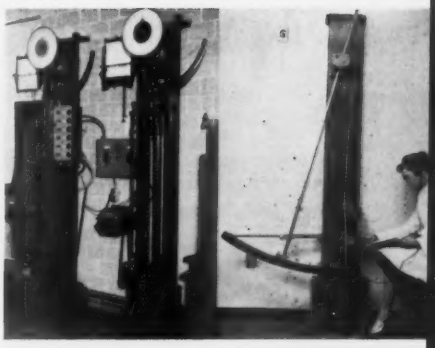


The Mixing Room includes an instrumented Banbury Mixer. The instrumentation allows exact temperature and power consumption analysis as well as controlled mixing.

The hydraulic presses in the Mill and Press Room which also includes an extruder, a two-roll mixing mill as well as a jacketed vulcanizer. Note the complete instrumentation.



Two units found in the Oven and Age Room, an ozone test chamber (left) and a Fade-O-Meter (right). Other equipment includes an oxygen bomb, convection ovens, etc.



The Tensile Testing Laboratory features a Scott Tester (left), a Goodyear-Healey Rebound Unit (right), as well as other equipment pertinent to the laboratory's efficient operation.

The Physical Testing Laboratory includes a Goodyear Angle Abrader, a Mooney Shearing Disc Viscometer and Goodrich and Firestone flexometers among its testing equipment.

The Mooney Shearing Disc Viscometer in the Physical Testing Laboratory is said to be the only unit of its type conforming to applicable ASTM methods of test.

AIEE Holds Conference On Rubber and Plastics

► The American Institute of Electrical Engineers held its 12th Annual Technical Conference on Rubber and Plastics on April 25 and 26 at the Sheraton Hotel in Akron, Ohio. A total of eight papers were presented at sessions on automation of tire handling systems; computers; instrumentation; and rotating machinery. A. S. Miller (Firestone) was the keynote speaker, and his subject was "Rubber Processing Techniques." He stated that the design and application of electric drives and control systems for highly specialized rubber processing equipment requires that the electrical engineer keep the basic chemical and physical properties of rubber polymers well in mind. Mr. Miller reviewed various rubber compounding methods including the problems of temperature changes, aging effects, blending requirements, mixing techniques and other processing fundamentals that must be considered by machinery designers. Abstracts of the papers presented during the two-day meeting follow:

Automation of Tire Handling Systems, *by A. P. Wiles (Airborne Instruments Laboratory).* A discussion of techniques of automation to sort finished tires as to type preparatory to warehousing them and to bring green tires from the make up area to the proper molding machine. The latter is treated from two different approaches, both of which utilize a central memory and computer which in turn can be used for inventory and production control.

Programming Scientific Problems On Digital Computers, *by J. R. Hopkins (Monsanto).* An electronic digital computer can be a valuable tool in solving scientific problems. The programming of such a problem for the digital computer is similar to writing a mathematical model of the problem in formula form. The mechanics of this type of programming will be illustrated with a discussion of how a program functions in the digital language of the computer.

Trend Toward Miniaturized Industrial Controls, *by C. W. Hibscher (Toledo Scale).* The use of miniature control components in the manufacture of industrial control equipment is increasing in popularity. This is due to the high degree of reliability and the economic and functional advantages that miniature components offer. The problems associated with, and the attributes of, this type of control will be discussed.

Sensing Devices For Automatic Machinery Control, *by J. R. McCarty (Firestone).* This paper is a general treatment of the use of transducers for automatic machinery control in the tire industry in which the less conventional types are accented. A philosophy for the engineer applying these devices and techniques is presented. Important measurements for which there are no satisfactory commercial transducers are also discussed.

Infrared Temperature Measurements, *by R. H. Kennedy (Bristol Company).* For over 150 years, various types of thermal and photo detectors have been developed to measure the infrared radiation being emitted by an object. Applications depending on infrared detection are legion. This paper discussed the basic principles of operation, the equipment available, and the advantages and limitations of some radiation pyrometers commercially available.

Web Guiding Devices, *by E. E. Hunter (Goodyear).* This paper deals with the necessity of developing web guiding systems for the tire fabric and considers the evolution of ideas for solving problems

ASME Committee Plans Conference

► Members of the Executive Committee of the Rubber and Plastics Division of the American Society of Mechanical Engineers met recently at the Lawrence Hotel in Erie, Penna. to plan their National Conference, to be held in Erie October 9 to 11. In the photo are (left to right): *seated*, C. Howard Adams (Monsanto Chemical), national chairman and George H. Billman (Lord Manufacturing), general chairman; *standing*, W. K. Taft (Chemical Seals), M. O. Longstreth (Dow Chemical), secretary, and M. D. Gunselman (G-E), section chairman. Included in the conference program will be technical papers covering four basic subject classifications: vibration and shock control, bonding of engineering structures, non-rigid structures, and automation of rubber and plastics processing. Dr. Turner Alfrey (Dow Chemical) will be guest speaker at a luncheon to be held October 11. An industrial exhibit will run concurrently with the technical program.

associated with this need. The essential desirable features of automatic web guides are presented and the principles involved in their application are discussed in this paper.

Mechanical Considerations In The Design And Installation Of Large Electrical Equipment, *by B. B. Winer (Westinghouse Electric).* Careful consideration of various mechanical features is required in the design and installation of large rotating electrical equipment. For such equipment to operate properly, it must not only be designed conservatively, but must be installed correctly. The installation procedure for this class of equipment will be discussed as affects the component parts as well as the equipment as a unit installation.

Static Application Of Excitation To Synchronous Motor Fields, *by R. M. Hayford (Westinghouse Electric).* This paper covers the application of small, reliable semiconductors to replace conventional relays for synchronous motor field application, pull-out protection and damper winding protection. The resultant reduction in the number of moving parts and contacts necessary for these operations has resulted in a compact, trouble-free controller.

Joins Goodyear Chemical

► George T. Wingate has been appointed senior sales representative to the Chemical Division of Goodyear Tire & Rubber Co. He will be assigned to the division's Philadelphia district but will cover primarily the Washington D. C. and Baltimore areas for the division's line of synthetic rubbers, latices, plastics and chemicals. Prior to joining Goodyear, Mr. Wingate was associated with a leading heel and sole manufacturer as purchasing agent. He was graduated from St. Johns College, Annapolis, Md. with a bachelor of arts degree in government economics.

Witco Names Tumpeer

► Witco Chemical Co., Inc., New York, N. Y., has announced the election of Joseph J. Tumpeer as senior vice-president. According to the company, Mr. Tumpeer will also serve as a special advisor to Max Minnig, Witco president. Mr. Tumpeer joined Witco in 1921. In 1952 he became vice-president in charge of asphalt sales and manufacturing.

Left to right, Hon. Robert B. Meyner, Governor of the State of New Jersey, George F. Blasius, president of Cary Chemicals, Inc., and Bernard M. Berns, RUBBER AGE staff editor discuss Cary Chemicals' part in the growth of the chemical industry in New Jersey, at a reception prior to the formal opening and dedication of the company's vinyl resin plant in Flemington, N. J.

Cary Dedicates Resin Facilities

► George F. Blasius, president of Cary Chemicals, Inc., New Brunswick, N. J., speaking at the April 27 dedication of the company's new addition to its PVC homopolymer and copolymer facilities in Flemington, N. J., stated that Cary is now geared to provide a minimum of 50 million pounds of resins annually. He pointed out that in addition to more than tripling its resin producing capacity to meet increased demand, Cary has also expanded its compounding facilities at its East Brunswick, N. J., plant to provide for a minimum of 36 million pounds of compounds annually.

Guest speaker at the dedication ceremonies was the Hon. Robert B. Meyner, governor of the State of New Jersey. Gov. Meyner discussed the growth of prestige industries in New Jersey, with particular attention to the rapid growth of the chemical industry.

In 1957, the Flemington installation went on stream with a rated capacity of 12 million pounds of resin annually, and the new addition now brings the capacity to 50 million pounds. According to Mr. Blasius, new pilot plants are in operation at both Flemington and East Brunswick which will permit greatly intensified product development for Cary Blacar products. All company departments, including manufacturing, research and development, sales, financing and warehousing facilities have been extensively expanded.

U. S. Rubber Nylon Tire

► U. S. Royal Air Ride, a low-priced nylon passenger tire with extra body strength and improved skid and traction performance, has been announced by the U. S. Rubber Co. The tire is pressure tempered after vulcanization, to give it greater dimensional stability, more mileage and more dependable performance, according to the company. It is available with or without a two-inch wide white sidewall, in sizes 6.00-16, 6.70-15, 7.10-15 and 7.60-15, all tubed type, and in 7.50-14, tubeless, with a heavily inserted, 7-row tread design.

Reeves Produces Coating

► A new low-cost rubber coating called Reevrain is available from the Vulcan Rubber Products Division of Reeves Brothers, Inc., New York, N.Y. It is applied to such products as customers' coatable cotton or rayon fabrics for rainwear, cosmetic bags, sleeping bags, and hunters' garments. Available in light and dark blue, pink, tan, gray, olive drab, and black, the coating will be four ounces per linear yard, and can be applied to fabrics from 30 to 60 inches in width. Nylon, as well as rayons and cottons, will be coated at the Reeves-Vulcan plant, Buena Vista, Va.

Humble Polyolefin Unit Makes Polypropylene

► A plant designed to produce initially 40 million pounds a year of polypropylene was put on stream on May 10 at the Baytown, Texas, refinery of Humble Oil & Refining Co. To be marketed by Enjay Chemical Co. under the trade name Escon, the plastic material is said to be strong, resilient, rigid, smooth, resistant to heat and chemicals, and light in weight. It can be made into molded products, films, sheets of plastic, or strands of fibers.

The new polyolefin unit, operated by the Humble Division of Humble Oil & Refining Co., occupies an area equal to three city blocks and represents an investment of more than $30 million including research and development. According to William Naden, executive vice-president and director of Humble Oil & Refining, the ultra-modern plant marks the full-scale entry of Humble and its parent company, Jersey Standard, into a new phase of the petrochemical industry. He pointed out that once a company is in the plastics business there is a real incentive for it to develop and market newer and better plastics. Thus a pilot plant will be operated at the Baytown Research Center to provide information, to aid in plant operations, and to develop data on the manufacture of new grades of polypropylene.

William Naden (right), vice-president and director of Humble Oil & Refining Co., discusses the significance of Jersey Standard's entry into the plastics field with the opening of Humble's polypropylene plant at Baytown, Texas, with Ray H. Horton (center), president of the Humble Division, and Bernard M. Berns (left), RUBBER AGE staff editor.

The new polyolefin plant culminates a three-year master plan that began with basic research on catalysts and chemical reactions. Although its initial capacity will be 40 million pounds a year, the plant has basic facilities to allow later expansion of production to 100 million pounds of polypropylene a year.

In producing the polypropylene the raw material used is a refinery gas known as propylene which is altered chemically, by a special catalyst and other factors, into a super polymer. It is a process in which the catalyst, the solvent, and the propylene are introduced continuously. A steady stream of the finished polymer is removed and sent to continuous drying and finishing operations and the solvent is continuously purified and re-used. The petroleum-based plastic is extruded in spaghetti-fashion, chopped into small pellets, and packaged in 50-pound bags for shipment to product manufacturers.

The resulting products can be used to make a wide variety of plastic items. A company spokesman reports that molded polypropylene items, such as water tumblers, are both durable and attractive. Films for packaging and wrapping are clear, yet glossy and tough. Various end-uses foreseen include synthetic fibers and piping materials, and scores of other potential polypropylene products are being studied.

Offers Prime Advantage

A prime advantage of Humble's polypropylene is that it is said to retain its basic shape up to 290°F. and it will not melt until the temperature reaches 335°F. The Escon polypropylene plastic comes in three process levels—1½, 3½ and 5½ melt index, measured at 230°C. According to J. E. Wood, III, president of Enjay Chemical Co., Escon's three viscosity levels provide ease of processing comparable to existing large volume plastics. He pointed out that the three levels of processability are being provided without sacrificing quality, specifically in the strength and resistance to heat distortion that makes polypropylene outstanding.

Hot polypropylene, resembling strings of spaghetti as it flows from an extruder unit, being produced at Humble's new polypropylene plant at Baytown, Texas. The material is cooled and chopped into small pellets for packaging and shipment to product manufacturers.

J. E. Wood, III (right), president of Enjay Chemical Co., and Bernard M. Berns, RUBBER AGE staff editor, examine polypropylene mono-filament, which was produced at Enjay's plastics wing in Linden, N. J.

Simultaneously with the opening of the Baytown unit, Enjay, a division of Humble Oil & Refining, opened its new plastics wing in Linden, N. J. The plastics wing is a complete laboratory and will be devoted to technical service in the plastics field. The wing contains all existing types of plastics fabricating equipment, and according to Mr. Wood, this equipment will be used to solve customer problems and to develop new profitmaking uses for the customers.

At the marketing end of the polypropylene operation, Enjay has signed a four-year contract with Spencer Chemical Co., Kansas City, Mo., which gives Spencer access to half the production from Humble's 40 million pound per year polypropylene plant. Under the agreement Humble will produce the resin to Spencer's specifications. Product improvement developed through Spencer will first be offered for sale by Spencer. Enjay's improvements will be sold first by Enjay.

VPAG Elects Officers

► New officers were elected by the Vinyl Professional Activity Group at the 16th annual technical meeting of the Society of Plastics Engineers, which was held recently in Chicago. Sol Gobstein (Ferro Chemical) has been elected chairman for 1960 succeeding Robert Abeles (Elfskin). Joseph B. Clancy (Emery) has been named first vice-chairman; Irvin Podell (Podell), second vice-chairman; and Walter Waychoff (Monsanto Chemical), secretary. The group studies and disseminates technological information on the processing, compounding and use of materials relative to vinyl plastics.

Produces Mold Release

► Fluoro Carbon Telomer, introduced by Miller-Stephenson Chemical Co., Inc., South Norwalk, Conn., has introduced a transparent mold release and lubricant which need only be buffed and sprayed with a soft cloth. According to the company, no drying or baking time is required. It is said to be an excellent mold release for epoxy resins and silicone rubbers, as well as a lubricant.

Onyx Merger Announced

► Onyx Oil & Chemical Co., Jersey City, N. J., merged with the Onyx Chemical Corp. on March 31, retaining the name Onyx Chemical Corp. The publicly-held corporation has acquired all of the outstanding shares of Onyx Oil stock and will do business under the same management and at the same locations.

Making New Rubbers

► Two new synthetic rubbers, Natsyn and Budene, will be produced in a new, multi-million dollar plant to be constructed near Beaumont, Texas, by Goodyear Tire & Rubber Co., Akron, Ohio. E. J. Thomas, Goodyear board chairman, states that Natsyn is made from isoprene and Budene is made from butadiene, both derivatives of petroleum. Natsyn, according to Mr. Thomas, has a physical structure which is said to duplicate the natural rubber molecule and can be used both as an extender and a replacement for the natural product, and Budene is an extender for natural rubber. Both rubbers, he said will be used in tires, industrial products such as conveyor belts, and in other products requiring their unique properties.

Union Carbide Opens New Laboratory

► Union Carbide Chemicals Co. is now operating a new Technical Service Laboratory in Tarrytown, N. Y., in line with the company's policy of supplying complete test data and service backup to its customers, and its belief that a chemical sales representative must offer the technology needed to help his customers use products profitably. Work in 29 major industry groups is being handled at the laboratory.

The new facility centralizes and expands Carbide's customer service and use-research that, since 1925, had been carried out principally at Mellon Institute in Pittsburgh. The company is stressing use - research programs which are creative — designed to expand and diversify the use of chemicals, J. A. Field, vice-president, marketing, explained at the May 12 opening of the laboratory.

The laboratory building accommodates about 100 scientists with a supporting and administrative staff of 50 people under the direction of Dr. A. B. Steele. The main portion is a three-story stainless steel and glass building, 300 feet long and 60 feet wide. A mechanical test building containing a two-story test area and a mezzanine office area is connected to the main laboratory in the facility.

A Carbide technician fills a cardboard mold in one of the foam-making machines at the new Technical Service Laboratory of Union Carbide Chemicals Co. Improved polyether foams for cushioning and insulation are among the products being developed at the Tarrytown, N. Y., laboratory.

Officers of the Northern California Rubber Group and guest speakers at the group's April 14 meeting: left to right, Keith Large (Oliver Tire), vice-president; James Leefe (Marshall, Leefe and Ehrenkrantz), speaker; Frank W. Wilcox (Witco), speaker; Bernard W. Fuller (DuPont), president; and Donald M. Preiss (Shell Deve.opment), secretary.

Northern California Hears Wilcox

► "The Value of the Ozone Test for Estimating the Durability of Rubber Products," was the subject of a talk presented by Frank W. Wilcox (Witco) at a technical session held by the Northern California Rubber Group on April 14 at the Elk's Club in Berkeley, Calif. James Leefe (Marshall, Leefe and Ehrenkrantz, Architects) was the after-dinner speaker, and he discussed "Trends in Architectural Design."

In his presentation, Mr. Wilcox described recent advances in ozone testing and correlation between outdoor exposure and ozone cabinet tests. He remarked that the cracking of rubber products when exposed to weather or ozone presents a major problem. When rubber under stress is exposed outdoors, it often does not follow a normal expected aging cycle, thus its weathering characteristics are highly unpredictable. The speaker pointed out that factors such as ultra violet light, extremes in temperature and atmospheric gasses, particularly ozone, are directly or indirectly responsible for its erratic behavior. Mr. Wilcox stressed that since these factors vary with location and season, the true weather aging properties of a rubber compound are necessarily determined by long term exposure, preferably under actual service conditions.

According to Mr. Wilcox, experience indicates that wide discrepancies often exist between the accelerated ozone test and actual outdoor exposure, even on samples taken from the same specimen. He drew the conclusion that the accelerated test as now run is of questionable value for estimating the outdoor durability of natural rubber of butadiene-styrene compounds that depend on wax or combinations of wax and antiozonant for protection. He pointed out that the major cause of the lack of correlation appears to be due to the inability of the accelerated ozone test which is confined to a very limited set of test conditions, to duplicate natural outdoor weathering where wide variations in temperature, ultra violet radiation and ozone concentration are the rule. It is highly possible, he informed the group, to select materials which will bloom and protect the rubber in the accelerated ozone test but fail completely outdoors where exposure conditions are often completely different from those used in the ozone test.

In his after-dinner talk, Mr. Leefe discussed such items as sealants and sealing methods required for prefabricated sections and flexible thin-shell structures. He also covered other rubber applications in architectural design.

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England Promoted

► John A. England, Jr., has been appointed secretary-treasurer of U B S Chemical Co., Cambridge, Mass. He succeeds Charles V. Glynn, who recently was elected comptroller of A. E. Staley Manufacturing Co., Decatur, Ill., parent company of U B S Chemical. Mr. England graduated from Boston University in 1949, and prior to joining U B S Chemical had been associated with Saco-Lowell Shops, Boston, Mass., as assistant treasurer.

Merger Proposals Prompt Proxy Battle

► A proxy fight for control of Industrial Rayon Corp., Cleveland, Ohio, was expected to highlight the company's May 27 annual meeting, following on the heels of cancellation of a planned merger by Texas Butadiene & Chemical Corp., New York, N. Y.

Meanwhile, Industrial Rayon has announced major management shifts with Frederick L. Bissinger, Jr., taking over as president and chief executive officer, while former president Hayden B. Kline, was elected chairman. Mr. Bissinger was formerly executive vice-president and general manager.

Attempts to block the proposed merger which was agreed upon by officers of the two companies on March 28, began with the filing of a suit in Federal Court on April 22, charging the directors with dissipating and wasting the company's assets. In a separate move, Alexander Haberman, who, with his family, owns 400 shares of Industrial Rayon common, began to solicit proxies to aid him in a fight against the merger at the company's stockholders' meeting. Mr. Haberman disputed merger terms which called for the exchange of 1.43 common shares of Industrial Rayon for one common share of Texas Butadiene and 5.6 Industrial Rayon preferred shares for one preferred share of Texas Butadiene, asserting in his proxy solicitation that if the merger went through Industrial Rayon book value would drop to $22.95 a share, while that of the former Texas Butadiene stock would appreciate to $32.82.

Federal Court Action

The insurgent stockholders lost their action in Federal Court, and the merger was approved by a 73.6 per cent vote of the stockholders. A two-thirds vote was required for the approval; 10.3 per cent of the shares were voted against the merger.

However, on May 2 John D. Fennebresque, president of Texas Butadiene, announced that the board of directors had exercised its right to terminate the merger agreement. The board had decided, he announced, that the merger was not advisable in view of the fact that a large number of stockholders of Industrial Rayon had filed written objections to the merger and under the Delaware appraisal statute had the right to demand payment in cash for their shares.

The May 12 announcement of Industrial Rayon's shift in management also included the news that Mr. Bissinger has been elected a director and member of the executive committee. He fills a board seat vacated by the resignation of Harry F. Byrd, Jr.

Meanwhile in Washington a four man group calling itself the Stockholders Protective Committee of Industrial Rayon notified the Securities and Exchange Commission that it would solicit proxies to name its own directors to oppose the management slate up for election at the annual meeting which was to have been held May 27 in Cleveland. Two of the four members of the group, who filed 14-B statements with the SEC, Alex L. Rosen and Roman Shvetz, opposed the proposed merger. The other two committee members who filed are H. M. Bailey, Jr., and Joseph Ginsburg. In filing a proposed proxy statement on May 10, the committee was facing a deadline as 14-B statements usually require ten days to clear and proxies cannot be solicited until the material has been cleared by the SEC.

Mr. Rosen is attorney for the stockholders' committee but said he owns no Industrial Rayon stock. Mr. Shvetz said he has acquired 6,500 shares over the past year and has a 20 per cent interest in a joint venture which owns an additional 3,800 shares. All the shares held by the joint venture, he said, would be voted for the slate of directors to be named by the protective committee. Mr. Bailey, who owns no Industrial Rayon stock, said he will be a candidate for director on the insurgents' slate. He said he "served in a consultant capacity" to Industrial Rayon between 1956 and 1958 but currently has no relations with management. Mr. Ginsburg said he owns 600 Industrial Rayon shares directly and 400 shares indirectly, all acquired since March. He said he would be a member of the directors' slate to be named by the stockholders' committee.

According to company sources, Industrial Rayon is planning sizeable reductions in production and employment at its Cleveland tire cord plant. The plant will, however, continue in operation. No cut back has been planned for the company's Painesville, Ohio plant, which turns out rayon textile fibres as well as tire cord.

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Financial News

Armstrong Rubber

► Six months ended March 31: Consolidated net income for the first half of the fiscal year totaled $1,661,141, equal to $1.07 per share on the common shares outstanding, compared with $1,584,089, or $1.02 per common share, in the corresponding period last year. Consolidated net sales amounted to $40,504,714, compared with $41,271,922 in the same period a year ago. Included in the consolidated income before taxes for the six months was $190,000 in dividends received from two affiliates, the 50 per cent owned Armstrong Tire and Rubber Co., Natchez, Miss., and the 26.8 owned Copolymer Rubber & Chemical Corp. of Baton Rouge, La., as against $100,000 received from the two affiliates in the six months ended March 31, 1959. After taxes the net increase in dividend income amounted to $82,980 for Armstrong.

Pantasote

► For 1959: Net profits rose 316 per cent to $480,803, topping the net profit of $115,505 in 1958. Earnings for 1959 were equal to 81c per share, compared to 20c per share for 1958. Sales were $8,595,000, reflecting a 60 per cent rise from the $5,354,362 achieved in 1958. In addressing the stockholders at the annual meeting, Hans Wyman, president, credited general business conditions and the expansion and diversification of the company's operations for the record sales and profits.

Lamb Industries

► Quarter ended March 31: Profits for the period rose to $231,163.30, equal to 21c per share, as opposed to the loss of $29,308.81 which the company reported for the comparable period of 1959. Sales for the period totaled $4,054,991.11, an increase of 43.2 per cent over the previous year's first quarter figure of $2,830,542.26.

Mansfield Tire

► Quarter ended March 31: Earnings dropped to $152,090, equal to 11c a share, as compared to $389,942, or 29c a share for the comparable period last year. Sales, however, were up to $15,646,004, as compared to $15,331,367 for the same period in 1959.

U.S. Rubber Reclaiming

► Quarter ended March 31: A 20 per cent increase in sales and a 15 per cent increase in net income are reported, with sales for the period estimated at $2,100,000, up from $1,740,059 in the corresponding period of 1959. Net earnings are placed at $145,000, or 32c a share, compared with $126,561, or 28c a share, for the same quarter last year. C. H. Peterson, company president, explained that the gain in net of 15 per cent was less than the rise in sales because of increased labor and operating costs. He added, however, that an increase of half a cent a pound in the price of reclaimed rubber, which went into effect April 1, will offset this.

Goodrich

► Quarter ended March 31: Net income amounted to $9,078,953, equal to $1.01 a share, compared with $10,324,124, or $1.15 a share, for the first three months of 1959. Net sales amounted to $200,730,977, as compared with $195,825,645 for the same period of 1959, an increase of 2.5 per cent. According to John L. Collyer, chairman of the board, the lower income was due to low replacement tire prices and higher natural rubber and employment costs. He pointed out that replacement tire prices were raised from 3 to 5 per cent on February 15.

Thiokol Chemical

► For 1959: Net income of $5,521,631, which is equal to $1.22 per share, compared with $3,007,699, or 72c per share in 1958. Net sales for 1959 were $190,198,753, contrasted with $88,993,121 in 1958. The 1959 sales volume of the Utah Missile Division was 760 per cent above the division's sales volume in 1958. J. W. Crosby, president, said that while the company expected continued growth, the large gains in 1959 would "tend to overshadow the growth this year."

Detroit Gasket

► For 1959: Net income amounted to $976,716, equal to earnings of $1.25 per share of common stock, compared with the 1958 figure of $119,745, or 15c per share. Net sales in 1959 totaled $35,740,190, compared with $27,915,462 a year ago.

Roland V. Fisch

Named by Ohio Rubber

► Roland V. Fisch has been named vice-president in charge of manufacturing and engineering of the Ohio Rubber Co., Willoughby, Ohio, succeeding Raymond A. Mertz who has retired. A graduate of Ohio State University, Mr. Fisch holds a degree in mechanical engineering and has attended the Cornell University Graduate School of Business Administration. He began his career with Ohio Rubber in 1946 as a machine designer. A year later he was made plant engineer at the Conneautville, Penna., plant of the company, and in 1949 he was named maintenance superintendent for the Willoughby plant. In 1952 he became plant engineer there, and in 1957 he was appointed director of engineering.

Neoprene Casebook

► The Elastomer Chemicals Department of E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., has announced publication of the first of a series of periodic reports on the use of neoprene in the electrical industry. Published under the title "Wire and Cable Casebook," the first issue covers the DuPont synthetic rubbers: Hypalon, Viton, Adiprene and neoprene. Copies are available on request to the company.

Electronic Changes Name

► The Electronic Rubber Co., Stamford, Conn., has changed its name to Electronic Rubber & Plastics Corp., as being more descriptive of the company's work. The company blends and processes insulating materials for the electric wire and cable industry, and does a large portion of its business in plastic compounds.

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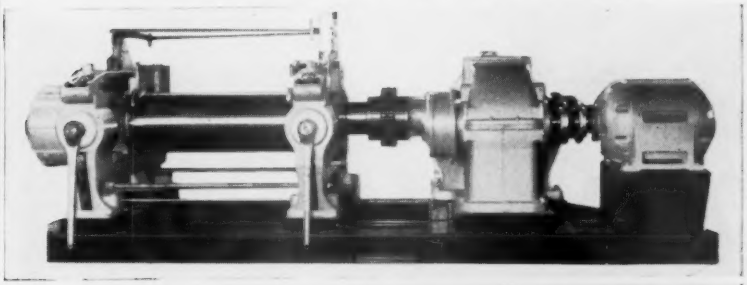

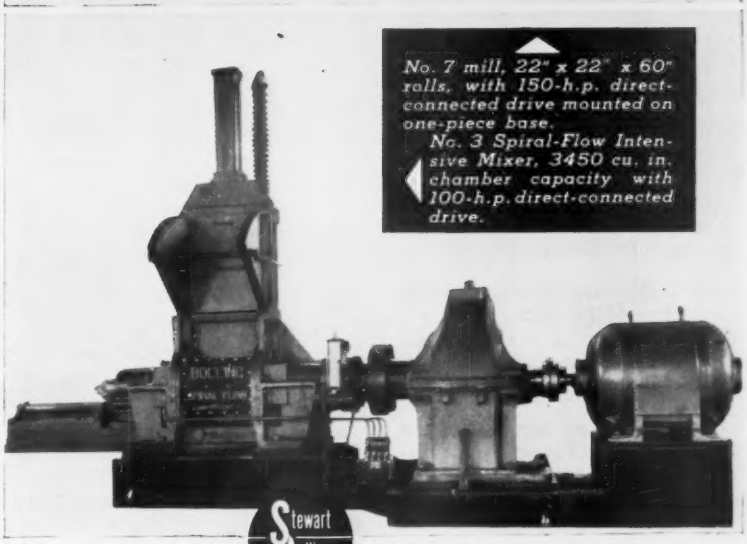

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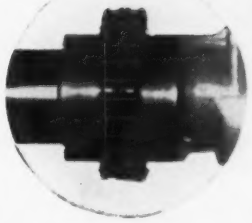

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Names in the News

Robert M. Aude, formerly vice-president and general manager of the Heyden Chemical Division of Heyden Newport Chemical Corp., New York, N. Y., has been appointed president of the Division.

Richard S. Loveless, formerly superintendent of the Poughkeepsie, N.Y. rubber plant of DeLaval Separator Co., has joined Goodrich-Gulf Chemicals, Inc., Cleveland, Ohio, as a technical service representative.

Howard K. Norris, formerly production manager of the Mechanical Goods Division of U.S. Rubber, New York, N.Y., has been named marketing manager of the Division.

Gorden B. Guenther, former product engineer at Thompson Ramo Wooldridge, Inc., Cleveland, Ohio, has been named director of engineering of the Industrial Electronic Rubber Co., Solon, Ohio.

Philip E. Robinson, director of communications of Tyrex, Inc., has been elected secretary of the non-profit association of Tyrex tire cord producers.

James T. Hoffman, president of the Mansfield Tire & Rubber Co., Mansfield, Ohio, has become a sponsor of the nonsectarian National Jewish Hospital, Denver, Colo.

I. Rogosin, president of Beaunit Mills, Inc., New York, N.Y., has been elected chairman of the board of Tyrex, Inc., which has its headquarters in New York, N.Y.

John N. Hart, controller of B. F. Goodrich Co., Akron, Ohio, for the last two-and-a-half years, has been named vice-president and controller.

Arthur N. Stuart has been placed in charge of manufacturers sales for the Firestone Tire & Rubber Co., Akron, Ohio, replacing **H. M. Taylor,** vice-president in charge of manufacturers sales, who has retired.

Joseph M. Smith, formerly a junior development engineer responsible for design work and maintenance coordination at the Akron plant of B. F. Goodrich, has been named plant engineer for the company's Development Center in Avon Lake, Ohio.

Dr. James G. Affleck, manager of the Rubber Chemicals Department of American Cyanamid, has been chosen president-elect of the Commercial Chemical Development Association.

J. Boyd Britton has been elected to the board of directors of Godfrey L. Cabot, Boston, Mass., and has been named vice-president of development.

Bruce Cantwell has been appointed personnel manager of the General Tire & Rubber Co.'s tire factory in Mayfield, Ky., due for completion towards the end of the year.

Thomas A. Wallace, Jr., formerly a specialist in product development for the General Chemical Division of Allied Chemical, New York, N.Y., has been appointed technical supervisor of Genetron sales for the Division.

Lee Cisneros, former general traffic manager of Godfrey L. Cabot, Inc., Boston, Mass., has been named director of traffic and sales services.

Joseph N. Kuzmick, divisional manager of the Manhattan Rubber Division of Raybestos-Manhattan, Inc., Passaic, N.J., was elected director of the corporation at the April 5 annual stockholders meeting of the company.

Marshall A. Williams has been appointed director of marketing and will be responsible for the activities of the newly created Marketing Department of Simplex Wire & Cable Co., Cambridge, Mass.

Dr. R. P. Dinsmore, vice-president in charge of research and development of the Goodyear Tire & Rubber Co., Akron, Ohio, has been elected to the company's board of directors.

L. N. Tinkham has been promoted to the newly created post of assistant sales manager of the Plastic and Rubber Products Co., Los Angeles, Calif., and will assist in the over-all direction and supervision of sales activities for the firm.

Vincent Casey

Huber Moves Office

► The Industrial Products Department of J. M. Huber Corp. has moved its New England offices from Boston to 123 Water St., Watertown, Mass. In addition to serving rubber and paper industry customers in the New England area, the new office offers warehouse space for clays, chemicals and carbon blacks. Vincent Casey continues in charge of sales to the rubber industry. Before joining Huber in 1954, Mr. Casey was in the Purchasing Department of Lever Brothers. He is a graduate of Brown University.

Ira W. Hutchison, Robert R. Peele, and **Robert G. Kroeger** have been appointed president, treasurer, and sales manager, respectively, of Dow Corning International S.A., new subsidiary of Dow Corning Corp., Midland, Mich. Mr. Hutchison continues as manager of the International Department of Dow Corning Corp. of Midland, Mich.

R. D. Young, formerly president of the Rubber Trade Association of New York, Inc., has terminated his employment with the association.

George A. Hudson, a chemist with Mobay Chemical Co., Pittsburgh, Penna., has received the firm's annual Research Award for 1959 in recognition of his work in the development of urethane coatings systems and polymer modifications.

U.S. Rubber and Borden Form Monochem

► A program for the construction of a 50 million dollar complex of chemical plants which would convert hydrocarbons into more than a dozen chemical products has been jointly announced by U. S. Rubber Co., New York, N. Y., and Borden Co., New York, N. Y. According to the two companies, they are forming a jointly-owned chemical company to be called Monochem, Inc., which would erect a major chemical manufacturing unit using hydrocarbons such as natural gas or low flash point liquid fuel as a starting point for the production of acetylene and vinyl chloride monomer. Present plans call for both companies to erect adjacent individually owned plants which will use the output of the Monochem plant for the manufacture of other chemical products.

The two companies have disclosed that they have purchased several industrial sites in Louisiana between Baton Rouge and eastern New Orleans, and in Texas in the Corpus Christi to Houston area. Other locations are under consideration. For some time, site survey teams have been making engineering studies of the properties under option. The new chemical company, it is reported, would be an economical source of basic chemical components for the present product lines of the parent organizations. The Monochem plant, on which construction will start later this year, initially will have the capacity to produce more than 80 million pounds of acetylene and approximately 150 million pounds of vinyl chloride monomer yearly. It is estimated that the new plant will be completed in 1962.

RMA Subdivision to Meet

► A program geared to "Planning for Profits in the Sixties" is expected to bring between 130 and 150 rubber manufacturers together at Skytop Lodge, Skytop, Penna., from June 20 through 22 for the largest meeting in the history of a Rubber Manufacturers Association product subdivision. Featured speaker at the gathering, the annual meeting of the Molded, Extruded, Lathe-Cut and Chemically-Blown Sponge Rubber Products Subdivision, will be Dr. Arthur S. Flemming, Secretary of the Department of Health, Education and Welfare. He will speak on the "Food Additives Amendment of 1958." The meeting itself will cover three days of working sessions.

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West Coast News

► Motorists in the Los Angeles metropolitan area will buy $156 million worth of tires, batteries and basic automotive accessories this year, according to Perce C. Rowe, group executive vice-president of U. S. Rubber Co., New York, N. Y. Seventy per cent of this sum, he believes, will be spent in Los Angeles and Orange county, outside of the city limits. Total consumption of TBA products in the State of California this year is forecast at $367 million, with the Los Angeles metropolitan area accounting for 42 per cent of the total state TBA market. California's motorists will split their 1960 TBA money this way, according to Mr. Rowe: 5 million new passenger tires worth $129 million; 900,000 new truck, farm and industrial tires, $56 million; 6 million retreads, $73 million; and $109 million worth of batteries, oil filters and other accessories.

► A baggage handling conveyor belt that can take care of 32 bags a minute is in use at International Airport, San Francisco. Manufactured by B. F. Goodrich Industrial Products Co., a division of B. F. Goodrich, Akron, Ohio, the belt system is said to carry bagagge up grades and around turns faster than conventional package handling conveyors. The Goodrich conveyor belting system was designed to be strong, flexible and light-weight; 3,300 feet of belting is utilized at controlled speeds ranging from 75 to 362 feet per minute. Included in the out-bound installation of the system are shore feeder belts 20 inches wide which carry baggage from the weighing scale at each check-in counter to the main conveyor. Eight conveyor sections equipped with Goodrich Griptop belting carry baggage on declines and inclines up to 25 degrees.

► U. S. Rubber Co., New York, N. Y., expects to have 28 company-owned tire "supermarkets" in operation in the Los Angeles metropolitan area by the end of this year, according to Perce C. Rowe, group executive vice-president. Mr. Rowe said that the new stores are part of an over-all move to broaden the company's distribution in the Los Angeles metropolitan area. Ten of the company stores have already been opened, eight of them since the first of the year. The company is also stepping up its drive to get more independent dealers and to help existing dealers to expand. The new stores are described as "TBA supermarkets," selling tires, batteries and auto accessories only, and offering related services such as wheel alignment, balancing and brake adjustment.

► George D. Godfrey has been elected president of the W. J. Voit Rubber Corp., Los Angeles, Calif., subsidiary of American Machine & Foundry Co. He succeeds Willard D. Voit, son of the founder, who becomes chairman of the board. Mr. Godfrey, a business administration graduate of Colby College, Waterville, Me., served three and-a-half years in the Navy and managed his own war surplus business in West Springfield, Mass., before he came west in 1949. Shortly after he became associated with Voit he was transferred to industrial engineering and then placed in charge of the department. He has been production manager, assistant to the president, and, since 1957, vice-president in charge of marketing.

► Frank R. Carvell, formerly production manager of the development center of B. F. Goodrich Chemical Co., Avon Lake, Ohio, has been named general manager of the B. F. Goodrich Rocket Motor plant, Rialto, Calif. He succeeds Harold W. Catt who has been appointed corporate director of purchases and traffic for the B. F. Goodrich Co., Akron, Ohio.

Perry Rubber to Merge

► Perry Rubber Co., Massillon, Ohio, will be merged into United Industrial Corp., Los Angeles, Calif., an electronics and industrial manufacturer, under the terms of a merger agreement, subject to the approval of the appropriate state and Federal governmental regulatory agencies. Also involved in the merger is Products Land Co., owner of property used in the business of Perry.

David L. Matthews

Named by Goodrich-Gulf

► David L. Matthews has been appointed vice-president, manufacturing, of Goodrich-Gulf Chemicals, Inc., Cleveland, Ohio. A 1935 graduate of Iowa State College with a B.S. degree in mechanical engineering, Mr. Matthews served with the United States Gypsum Co. and the B. F. Goodrich Co., joining Goodrich-Gulf in 1955 as chief engineer, later serving as manager of manufacturing. In his new post he is responsible for all of the company's production facilities at Port Neches, Texas, and Institute, West Va., as well as the design and construction engineering activities of the corporation.

Six Named by National

► Four new vice-presidents and two assistant vice-presidents have been named by National Rubber Machinery Co., Akron, Ohio. Frederick K. Lacher, secretary, was named vice-president and secretary. Three assistant vice-presidents were promoted to vice-president. They are: Halbert Frank, Disposer Division; E. E. Heston, Extruder Division; and E. E. Mallory, machine development. New assistant vice-presidents are R. K. Senn, extruder sales, and L. G. Turk, rubber machinery sales.

New Erie Engine Officers

► Erie Engine & Mfg. Co., Erie, Penna., reports that it is under new management. The new officers of the firm are: *President*, S. N. Bolling; *Vice-President*, Bernard Sobieraj; *General Manager*, R. E. Weller; *Sales Manager*, Thomas Kramer, Jr.

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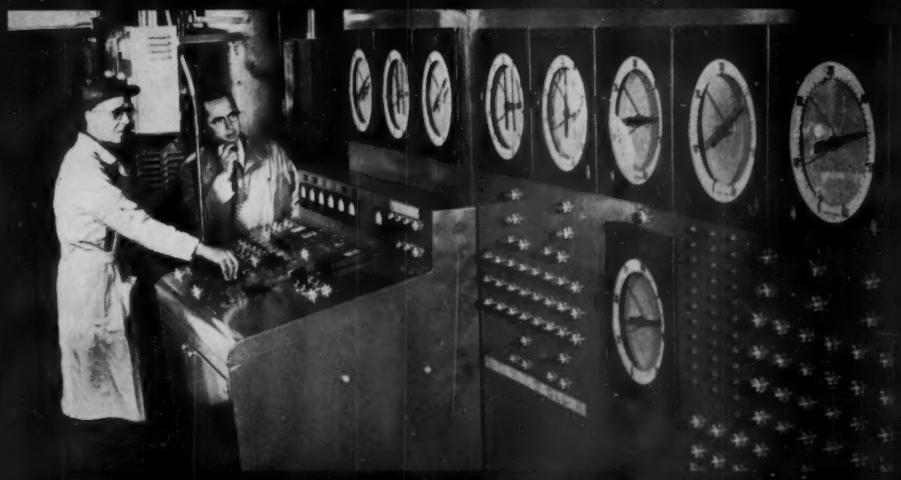

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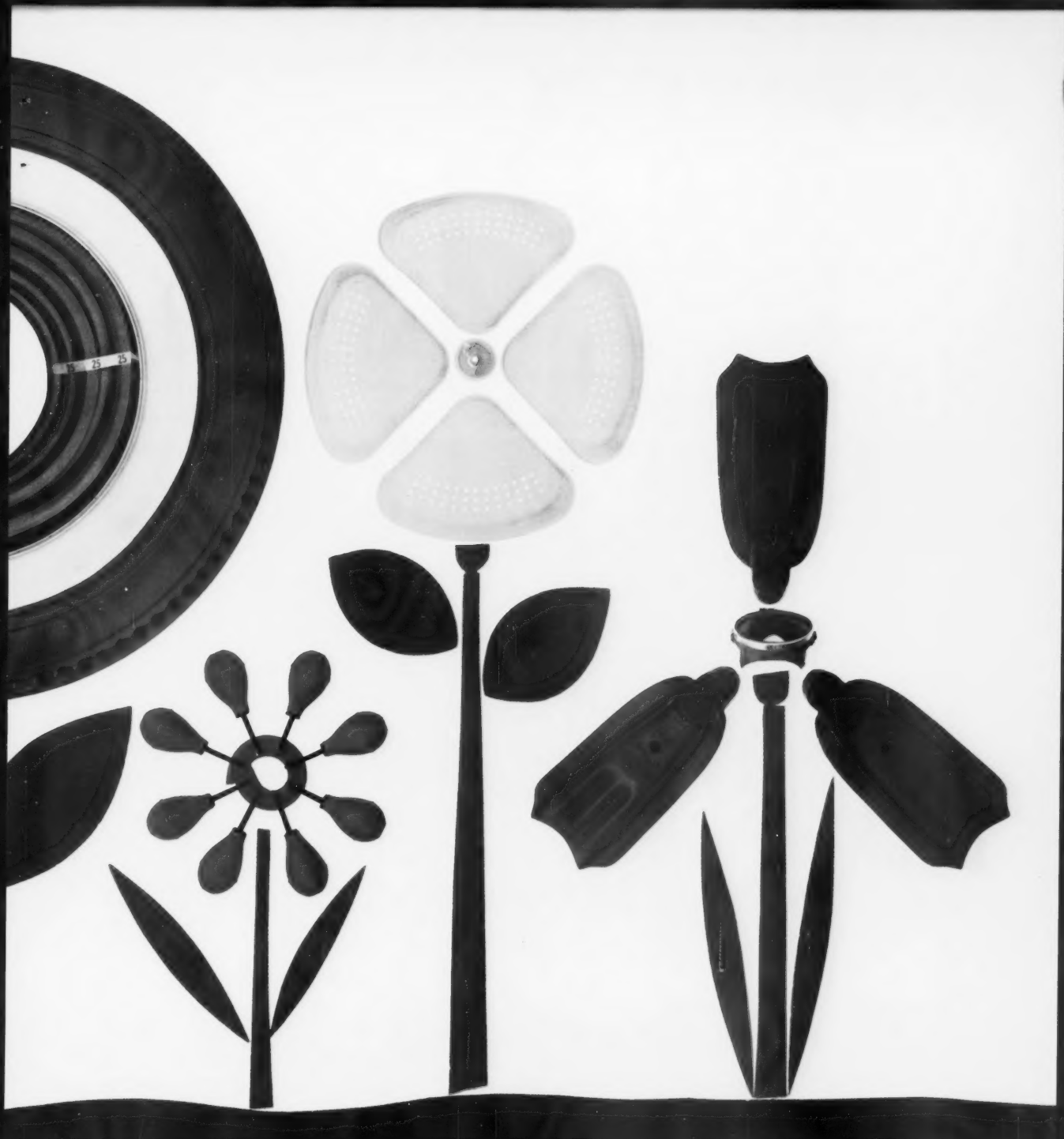

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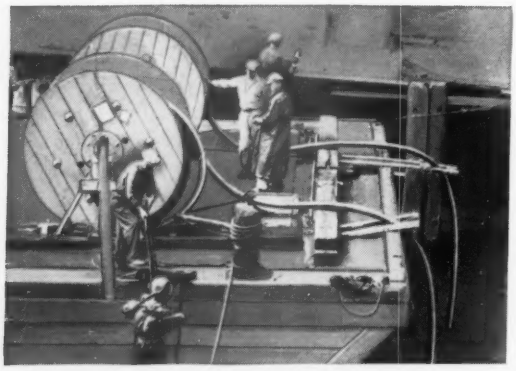

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Henry R. Lasman

Named Division Manager

► Henry R. Lasman has been appointed to the newly created post of manager, Organic Chemicals Division, of National Polychemicals, Inc., Wilmington, Mass. He was formerly manager of the firm's rubber laboratory, directing its technical service activities. In his new position Mr. Lasman will be responsible for the commercial development of the firm's line of organic chemicals, and his activities will continue to include over-all supervision of the rubber laboratory and its technical service operations. A graduate of the State Technical College of Zurich, Switzerland, Mr. Lasman has been associated with the Oerlikon Machine Tool Co., Societe Industrielle de Caoutchouc Co., both of Switzerland, and the Acton Rubber Co., Acton Vale, Quebec, Canada. He joined National Polychemicals in 1955 and is a member of the American Chemical Society and its Rubber Division.

New York Holds Dance

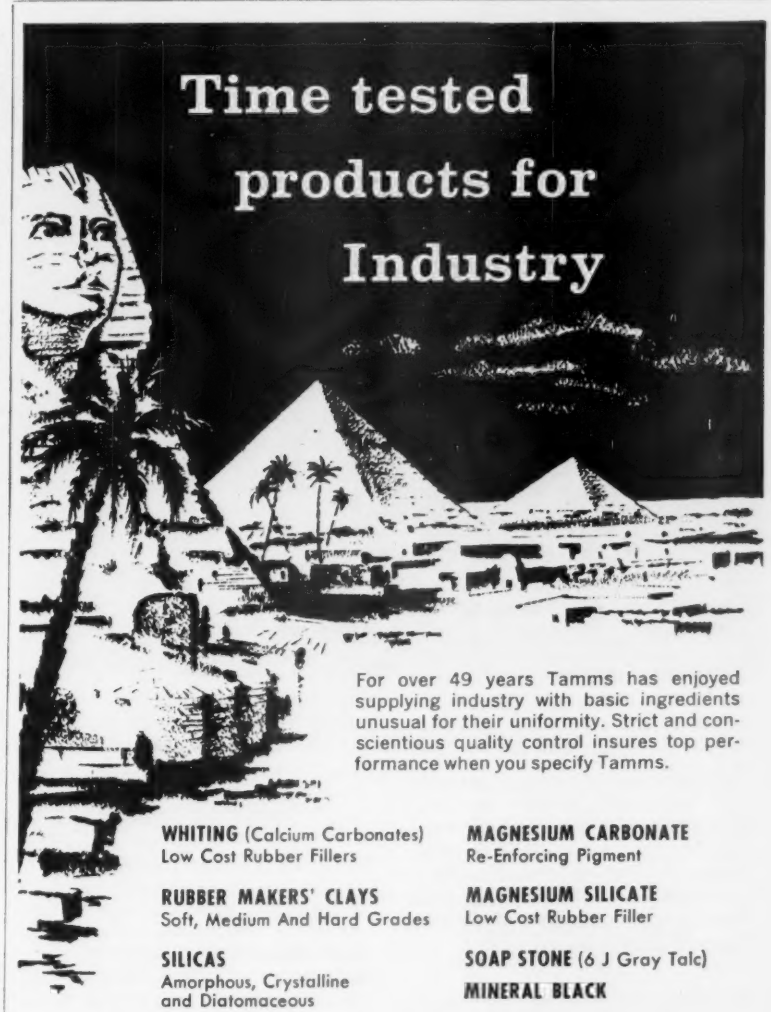
► The first annual dinner-dance of the New York Rubber Group, held on May 20 at the Roosevelt Hotel in New York City, attracted 180 persons. The festivities got under way at 6:30 P.M. with a cocktail party through the courtesy of suppliers. Dinner, which began at 8:00 P.M., featured steak or lobster. Music was provided by the Barry Brothers orchestra for the listening and dancing pleasure of the group members and their ladies during and after dinner. Table favors were distributed to all women present. The committee in charge of the dinner-dance consisted of Bertram A. Wilkes (Godfrey L. Cabot), Lester J. Koch (Westwood Chemical) and M. E. Lerner (RUBBER AGE).

Foster Becomes Manager

► James L. Foster has been named manager, polyethylene sales, of Goodrich-Gulf Chemicals, Inc., Cleveland, Ohio. The former technical representative in polyethylene market development is a graduate of Kansas State College with a B.S. in chemistry and mathematics. A Goodrich-Gulf employee since 1956, he was previously a development engineer with B. F. Goodrich Chemical Co. and Procter & Gamble. He is a member of the Society of Plastic Engineers.

United Clay Appoints Two

► Charles J. Bradt and Thomas J. Millett have been appointed to positions in the Sales Department of United Clay Mines Corp., Trenton, N. J. Mr. Bradt, who will cover the South and Southwest areas of the country, was graduated from Alfred University in 1959 with a degree in ceramics engineering. Mr. Millett, who will cover the North Central Midwestern states, is a graduate of Wagner College and has been associated with the General Chemical Division of Allied Chemical Corp.



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Canadian News

► Gutta Percha and Rubber Ltd., Toronto, Ontario, closed on April 22, and the company's 450,000 square foot plant has been sold for about $750,000. In announcing the closing, M. O. Simpson, Jr., company chairman, attributed the move to competition from foreign countries with cheap labor. Another factor was the company's inability to compete technically with Canadian subsidiaries of foreign companies.

Gutta Percha had a substantial loss in its 1959 operations and a comparable loss again this year. From 1950 to 1956, Mr. Simpson said, the company had earned reasonable profits—and from 1951 to 1958 it spent $3 million on capital improvements, more than the profits for the period. Its studies showed, however, that even the latest in plant and equipment would not significantly improve profits.

The company, formed in 1883, was at one time Canada's largest rubber manufacturer. Hit by the competition of United States firms after World War I, it manufactured automobile and truck tires until the 1950's. Shortly after its acquisition by Combined Enterprises Ltd. in 1950, it stopped making its own brand footwear. The company made rubber footwear for Dominion Rubber Co. until 1954 when its footwear operations were sold to United Rubber, Ltd. Since then, it has manufactured mostly industrial rubber products and automobile accessories. Seiberling Rubber Co. took over tread rubber operations which accounted for 50 per cent of Gutta Percha poundage and 20 per cent of its sales.

► G. J. Robichaud, formerly chief chemist for Acton Rubber Ltd., Montreal, Quebec, has become a consultant to the rubber and plastic industries, and is located in Granby, Quebec.

► Officials of DuPont of Canada have predicted that the replacement market for tires will amount to nearly 6 million units in 1960, seven per cent more than last year, and that by 1965 replacements will total about 10 million tires a year. New investment by the tire industry this year will total $25 million, DuPont estimates, predicting that, with consumer spending expected to advance by 5 or 6 per cent, the "tire market will again be relatively buoyant." Last year 8.9 million tires were shipped, an increase of 10 per cent over 1958.

► Polymer Corp. Ltd., Sarnia, Ontario, synthetic rubber producer, has signed an agreement with Petroleos Mexicanos to give technical assistance and advice in designing and building a plant to produce general purpose copolymer rubbers in Mexico. Polymer will also train some Petroleos Mexicanos employees in Sarnia, as well as assisting in start-up operations of the plant. Petroleos Mexicanos is an agency of the Mexican Government and has been operating as a fully integrated oil company since 1938. It has been expanding into the petrochemical field.

► M. F. Anderson and C. C. Thackray have been appointed president and chairman of the board, respectively, of the Dominion Rubber Co., Montreal. H. E. Humphreys, Jr., the former chairman, continues as a director. Mr. Anderson, a graduate of McMaster University, has been with Dominion since 1927. He was general manager of the Chemical, Latex and Reclaim Divisions prior to being appointed executive vice-president in 1959. Mr. Thackray joined Dominion in 1920 and has been president since 1946.

► D. N. Morris has been named secretary-treasurer of the Seiberling Rubber Co. of Canada, Ltd., Toronto, Ontario. Mr. Morris graduated from Royal Military College in 1953. Previously associated with Clarkson, Gordon Co., he joined Seiberling two years ago.

► Japan has agreed to a voluntary quota on waterproof rubber footwear exported to Canada. The quota is outside of current negotiations about quotas on cotton and rayon goods, stainless steel flatware, and plywood, which have bogged down. Under the new arrangements, rubber footwear ordered up to last December 31 was to have been shipped from Japan by May 15. The quota, which will go into effect May 15, will extend to the end of the year.

J. W. Keener

Heads Goodrich Board

► J. W. Keener, president and chief executive officer of the B. F. Goodrich Co., Akron, Ohio, has succeeded John L. Collyer as presiding officer of the board. The chairman's post, which was held by Mr. Collyer, will not be filled for the time being. Mr. Collyer was an officer of the company for 21 years. He relinquished his duties as chief executive officer in 1958, after heading the company for 19 years. From 1939 to 1950 he was president and chief executive. He was both president and chairman from 1950 to 1954 and has been chairman since then. He will continue as a member of the board and as chairman of the executive committee.

Petro-Tex Issues Manual

► Petro-Tex Chemical Corp., Houston, Texas, has recently published a new manual, "Handling C_4 Hydrocarbons," which provides prospective users with a background for understanding Petro-Tex C_4 Hydrocarbons and the voluminous codes and regulations on the safe handling of flammable hydrocarbons in pressure-type containers. Included in the manual are shipping data on all Petro-Tex chemicals as well as handling and storage techniques and general information regarding the unloading of cylinders, tank trucks, tank cars and barges. Fire and explosion precautions and a bibliography of references to safety codes and governmental regulations, keyed to text, complete this useful manual. The comprehensive manual can be obtained from Petro-Tex Chemical Corp., 8600 Park Place Boulevard, Houston 17, Texas.

William J. Ashe

Promoted by Witco

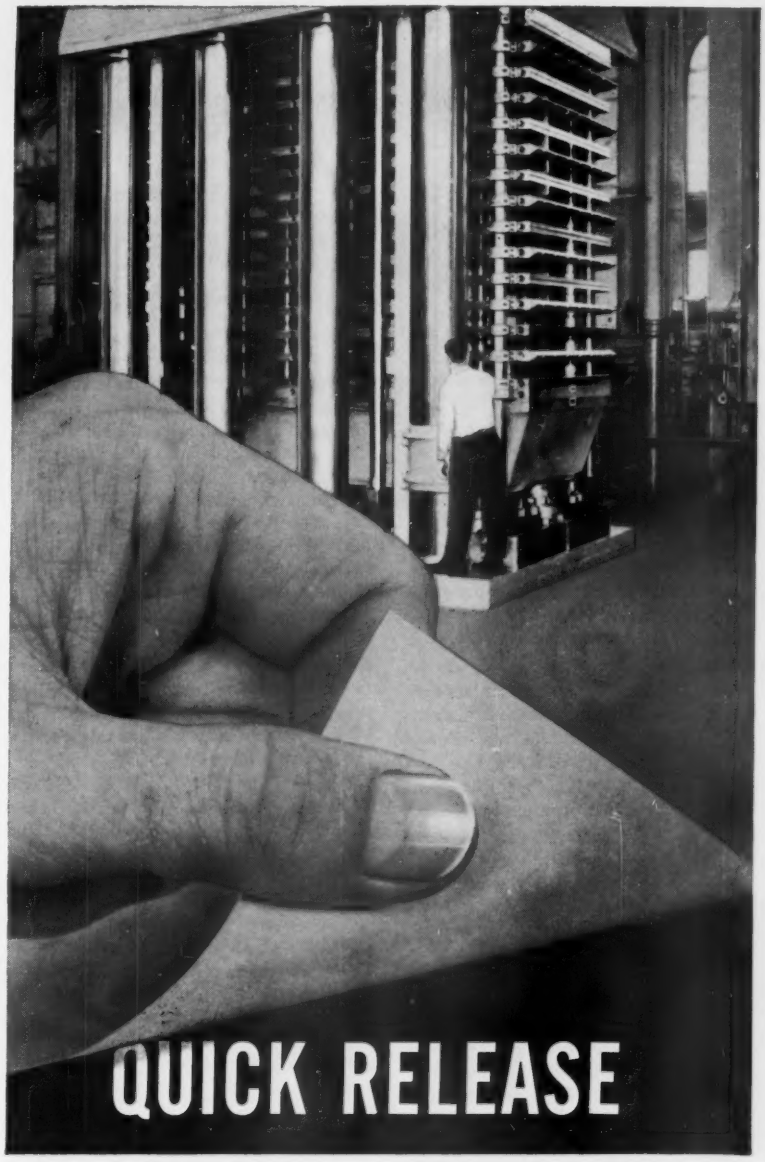
► William J. Ashe, formerly controller and assistant secretary of Witco Chemical Co., Inc., New York, N. Y., has been named administrative and financial vice-president of the company. In his new position he is responsible for the Accounting, Legal, Traffic and Insurance Departments. Both an attorney-at-law and a certified public accountant, Mr. Ashe was graduated from the University of Kansas City with a B.A. in accounting and economics. He holds an LL.B. from the University of Tulsa. Prior to joining Witco in 1957, he was controller of Continental Carbon Co., an affiliate.

Cosden Rubber Coating

► A coating developed by Cosden Paint Co., Beverly, N. J., has been designed to restore high gloss to rubber products dulled by manufacturing processes. The clear polyurethane coating has the ability to elongate as the rubber stretches, and then return to its normal state without cracking or checking, according to the company. Developed for use on rubber footwear, the coating is said to have a high resistance to scuffing and abrasion. It can be applied by spraying or dipping, and then cured for 15 minutes at 225° F.

Heads Goodrich Division

► J. C. MacKinnon, vice-president of sales at B. F. Goodrich Co., Akron, Ohio, has taken over direction of the company's footwear divisions, succeeding Raymond H. Blanchard who has retired after 43 years with the company. Mr. MacKinnon will head the Footwear and Flooring Division as well as the company's Hood Footwear Products unit. His title will be general manager and he will be located in Watertown, Mass.



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Obituaries

Dr. Philip Schidrowitz

► Dr. Philip Schidrowitz, famous as a leading authority on rubber and known for his contributions to the science and technology of the industry, died May 17 at his home in Ealing, a suburb of London, England. He was 88 years old, and had remained active in the industry up to the time of his death. A rubber consultant to the Firestone Tire & Rubber Co., Akron, Ohio, for 23 years, he was also the author of several books on the production of natural rubber and its industrial uses, and a regular contributor to the British magazine, *Rubber Journal and International Plastics*.

Born in Austria, he became a British subject and was educated at St. Charles College and University College School, London, England. He studied at the Federal Polytechnic, Zurich, and at the University of Berne. After becoming an industrial chemist in the Midlands, he established a practice as a consultant and analyst in Chancery Lane, London, beginning his study of rubber chemistry and technology in 1904.

He published papers on the viscosity of rubber solutions, the particle in latex, the structure of crude rubber, the preparation and coagulation of latex and the application of latex, as well as publications concerning his research in vulcanization of rubber; the rubber stress-strain curve; plasticity; and the testing and chemical examination of crude rubber.

At the beginning of the century he produced a specification for standardization of natural rubber which is still in use. Before carbon black came into general use he was associated with the production and use of colloidal clays, and was also connected with early work in the application and use of accelerators. In 1914 Dr. Schidrowitz joined in producing the first direct-from-latex sponge. He also patented a process for the vulcanization of a wet coagulum, found that latex could be vulcanized in the liquid state, and was responsible—with R. M. Ungar—for the development of softened rubber. He did work in the field of modified rubbers with Dr. C. A. Redfarn.

In 1911 he published his book, *Rubber*. He was also author of the "Rubber" article in Thorpe's *Diction of Applied Chemistry*, joint author with T. R. Dawson of *Rubber Derivatives of Commercial Utility in Chemistry*, and of major chapters in the *Encyclopaedia Britannica*. For 40 years he wrote his column, "Notes of the Week," for the *Rubber Journal and International Plastics*.

During most of his life he was mainly a consultant to leading rubber manufacturers in Great Britain and the United States. He continued his work in the field, even through the blitz of 1941 when his laboratories were destroyed.

Dr. Schidrowitz was among the founding members of the Institution of the Rubber Industry and last year was made the first life vice-president of the Institution. He was awarded the group's Colwyn Gold Medal as early as 1940. He was also a Fellow of the Chemical Society, a member of the Society of Public Analysts, a member of the Institute of Brewing and a member of the Society of Chemical Industry.

For some years he was director of the Rubber Department of the Royal Polytechnic Institute (now the National College of Rubber Technology), and one of the consultants to the Rubber Growers Association.

He is survived by his wife and two sons.

Donald H. Walker

► Donald H. Walker, treasurer of Goodyear Tire & Rubber Co., Akron, Ohio, died May 15 following a heart attack, in City Hospital, Akron. Mr. Walker, 48 years old, had been elected treasurer of the company only eleven days earlier. He was a graduate of the University of Akron and started his 27-year career with Goodyear as a clerical employee. From 1935 on, he was assigned to the company treasurer's office. Starting in 1941, he handled numerous overseas assignments for the company. In 1952 he became assistant treasurer. He was elected a director of the Goodyear State Bank at the same time he became treasurer. He is survived by his wife and daughter.

Herman T. Kratt

► Herman T. Kraft, chief experimental engineer for the General Tire & Rubber Co., Akron, Ohio, and holder of 240 patents in the airship, automatic machinery and tire development fields, died March 20 in St. Thomas Hospital, Akron, after a six-month illness. He was 69. Among his inventions were: the Kraft retreading process used by General Tire dealers, the hard rubber steering wheel used in cars, an all-rubber iron lung for poliomyelitis victims, and General's "squeegee" tires, fashioned in the '30s for use on wet pavement. During World War I he served in France as an aeronautical observer. He joined Goodyear Tire & Rubber Co., Akron, Ohio, in 1922, and spent five of his twelve years there as a consulting engineer. As Goodyear's chief aeronautical engineer he spent a year in dirigible research work in Germany in 1923. He joined General Tire in 1933. He is survived by his wife, a daughter, two grandchildren, and a sister.

John H. Edwards

► John H. Edwards, an electrical engineer for the Rome Cable Co., Rome, N. Y., died March 18 in Elizabeth General Hospital, Elizabeth, N. J. He was 67. Known as an authority in his field, Mr. Edwards was with the General Cable Co., Perth Amboy, N. Y. before joining Rome Cable. He was graduated from Cornell University in 1914 and served as a first lieutenant in the Army Signal Corps in World War I. Before World War II he was a consultant with Admiral Hyman Rickover in the Bureau of Ships in Washington. He was a member of the American Institute of Electrical Engineers, the Codes and Standards Committee of the National Electric Manufacturers Association, the American Standards Association, and the National Electrical Code Committee of the National Fire Protective Association. He is survived by his wife and a son.

Arthur J. Mahnken

► Arthur J. Mahnken, a recently retired vice-president of Sinclair & Valentine Co., New York, N. Y., manufacturers of printing and lithographic inks, died at the Lenox Hill Hospital in New York City on March 19 after a long illness. He was 65 years old. He is survived by his wife and a sister.

CRG Hears Talks On Oil Furnace Blacks

► Oil Furnace Blacks was the subject of a panel discussion held by the Connecticut Rubber Group on May 20 at Rapp's Paradise Inn, Ansonia, Conn. The session was attended by 100 members who heard the following papers: "Oil Furnace Blacks," by Dr. Isaac Drogin (United Carbon); "Measurement and Effects of Carbon Black Structure," by E. M. Dannenberg (Godfrey L. Cabot); "Road Test Performance of New Oil Furnace Blacks," by T. D. Bolt (Godfrey L. Cabot); and "Non-Tire Applications of Oil Furnace Blacks," by Harry J. Collyer (Godfrey L. Cabot). The program was under the direction of Vincent P. Chadwick (Armstrong Rubber), chairman of the Connecticut Rubber Group. The first speaker, Dr. Drogin, covered such topics as the method of manufacture of oil furnace black, producers, types, production, selling price, newly developed blacks, role of black masterbatch, properties and applications. In discussing the newly developed oil furnace blacks, he pointed out that the channel replacement black is recommended for highway, off the road truck and passenger tire treads, tread rubber, carcass stocks, high grade mechanicals, and where service requires typical channel black resistance to tearing, cutting and chipping.

According to Dr. Drogin, the new oil furnace black in the fineness range of ISAF is recommended in black masterbatch and for off the road tires, aircraft tires, race rubber and passenger car tire treads and tread rubber to obtain a quieter ride and better traction properties while maintaining good wear level. The new oil furnace black in the fineness range of SAF is recommended for black masterbatch and for premium tires and premium tread rubber for passenger treads to obtain the best combination of ride, low noise and tread wear, and the oil furnace SRF black is recommended in applications where SRF gas furnace black is being used, he remarked.

Mr. Dannenberg, the second speaker, pointed out that the modulus development in a rubber stock is a complex phenomenon involving not only the physical attributes of the filler but also an effect of the filler on the vulcanizing and cross-linking reactions of the rubber matrix. He explained that modern oil furnace blacks, including such grades as GPF, FEF, HAF, ISAF and SAF, generally give higher modulus and hardness properties in rubber when compared with the older gas furnace and channel blacks of comparable particle size. In addition, they are also markedly different in their effects on processing characteristics, giving smoother and faster extrusions.

The speaker stated that not all blacks made from oil raw materials give these properties. The use of parafinnic oils tends to give blacks more like gas blacks than the commercial grades of presently available oil furnace blacks which are made from more aromatic raw materials. Mr. Dannenberg explained that the use of aromatic oils in a channel-type process still gives blacks of the channel black type. This, he pointed out, demonstrates that both the type of raw materials and the actual process determine the quality of the final product. He emphasized that the high modulus and smooth processing properties of the oil furnace blacks have been attributed to structure.

Participants in the Oil Furnace Black panel discussion, held on May 20 by the Connecticut Rubber Group: left to right, T. D. Bolt (Godfrey L. Cabot), speaker; E. M. Dannenberg (Godfrey L. Cabot), speaker; Vincent P. Chadwick (Armstrong Rubber), chairman, Connecticut Rubber Group; Dr. Isaac Drogin (United Carbon), speaker; and Harry J. Collyer (Godfrey L. Cabot), speaker.

Cites Road Tests

The third speaker, Mr. Bolt, in his discussion on road test performance, informed the group that the new oil furnace blacks have been road tested in comparison with regular grades of oil furnace blacks or with channel blacks. He stated that several types of road tests were run: one, a comparison of Regal 300 with channel black in natural rubber passenger treads; two, a comparison of Regal 300 with channel black and with HAF black in natural rubber truck treads; and three, a comparison of Regal 300 and Regal 600 with HAF and ISAF black in butadiene-styrene passenger treads.

In summarizing the results of the tests, Mr. Bolt said that Regal 300 is offered as a lower cost replacement for channel black in natural rubber particularly where resistance to cutting and chipping is required. Regal 600 is offered for use in producing low hardness butadiene-styrene passenger treads and tread rubber with the wear resistance of an ISAF black.

Mr. Collyer, the final speaker, remarked that carbon black technology during the past two years has been directed toward four main fields of interest: first, the performance of various carbon blacks in the newer polymers, in particular butyl rubber; second, the incorporation and use of carbon black in butadiene - styrene latex copolymers; third, the development of blacks intended to meet the requirements of new concepts in tire compounding and design; and fourth, development and production of carbon blacks by the oil furnace process to replace channel and furnace blacks produced from natural gas.

The speaker pointed out that three new blacks have been made available to the rubber compounder for non-tire applications: Regal SRF, a direct replacement for gas SRF; Regal 600, a low modulus, low hardness ISAF black providing very high levels of tensile strength, wear resistance and protection against cutting, chipping and tearing; and Regal 300, a versatile channel black replacement at less cost for use wherever typical channel black resistance to tearing, cutting and chipping and other channel black properties are of importance.

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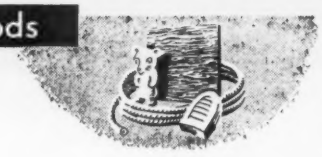
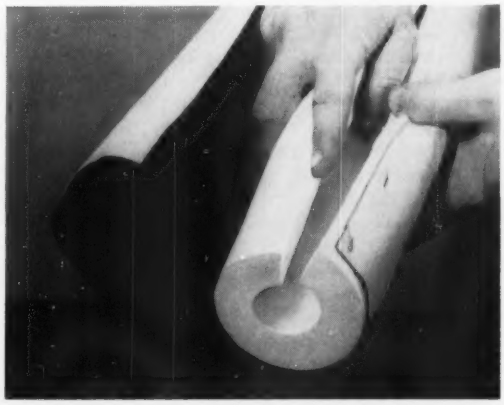
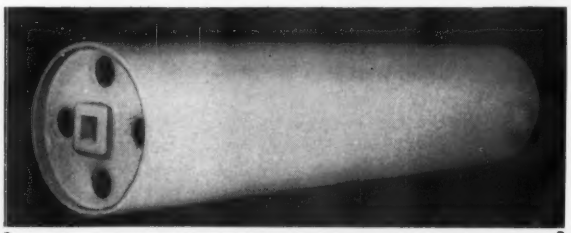


Thermax Pipe Insulation

► An all-purpose light-weight industrial pipe insulation called Thermax, fabricated of urethane foam, and produced by the American Cellular Co., Inc., New Castle, Del., is designed to insulate any pipe from —300°F. to 275°F. Reportedly cutting plant site installation costs as much



as 25 per cent, it is constructed with a longitudinal seam which allows it to spread open to receive the pipe and, upon release, to snap into the designated position. Due to its low K factor and longevity, the company recommends Thermax for industrial cold processing plants and commercial and institutional refrigeration systems where sub-zero conditions are the rule. The material can be used as an insulation in smaller-size hot water or low pressure steam lines operating at temperatures up to 250°F. and, when covered with a factory-applied moisture vapor barrier jacket, meets the requirements of dual temperature service needs.



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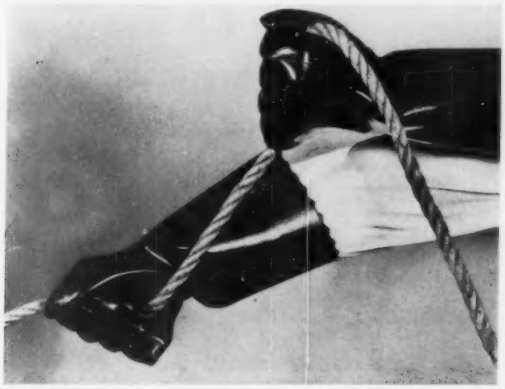
Hypalon Sheet Packing

►A new sheet packing that combines the performance features of Hypalon synthetic rubber and asbestos is being produced by Keasbey and Mattison Co., Ambler, Penna. According to the company, it has combined the chemical, ozone and aging resistance of Hypalon with the strength, inertness and economics of asbestos. The Hypalon, used as the base for the packing, shields the asbestos from chemical contact, greatly increasing wear life, in addition, the packing is not subject to cold flow under compression. The material is designed for such uses as gasketing on flanges, condenser heads, columns, hand and manholes, and pump casings.

"Multi-Pli" Work Glove

► Pioneer Rubber Co., Willard, Ohio, is manufacturing "Multi-Pli" Stanzoil Pacemaker Work Gloves made of neoprene which Pioneer claims will give more than three times the wear of ordinary coated gloves on many jobs. The liquid-proof gloves have a soft flannel inner-lining for



greater comfort and come in three styles: #92, knit-wrist; #122, 12-inch gauntlet; and #142, 14½-inch gauntlet. The palm and thumb crotch areas have been reinforced to provide a longer service life.

Presray Compound

►Presray Corp., Pawling, N. Y., is manufacturing a natural rubber material called Presray Compound No. 1704, which is said to resist the deteriorating effects of exposure to radiation. Developed specifically for use as a pneumatic seal, the compound can be molded or extruded for compression seals and other mechanical rubber uses. According to the company, the material is not a radiation barrier, however, the properties of the compound remain satisfactory when exposed to radiation.

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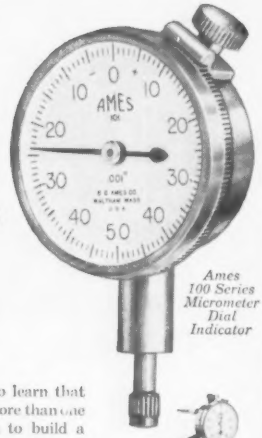

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Traffic Lane Buttons

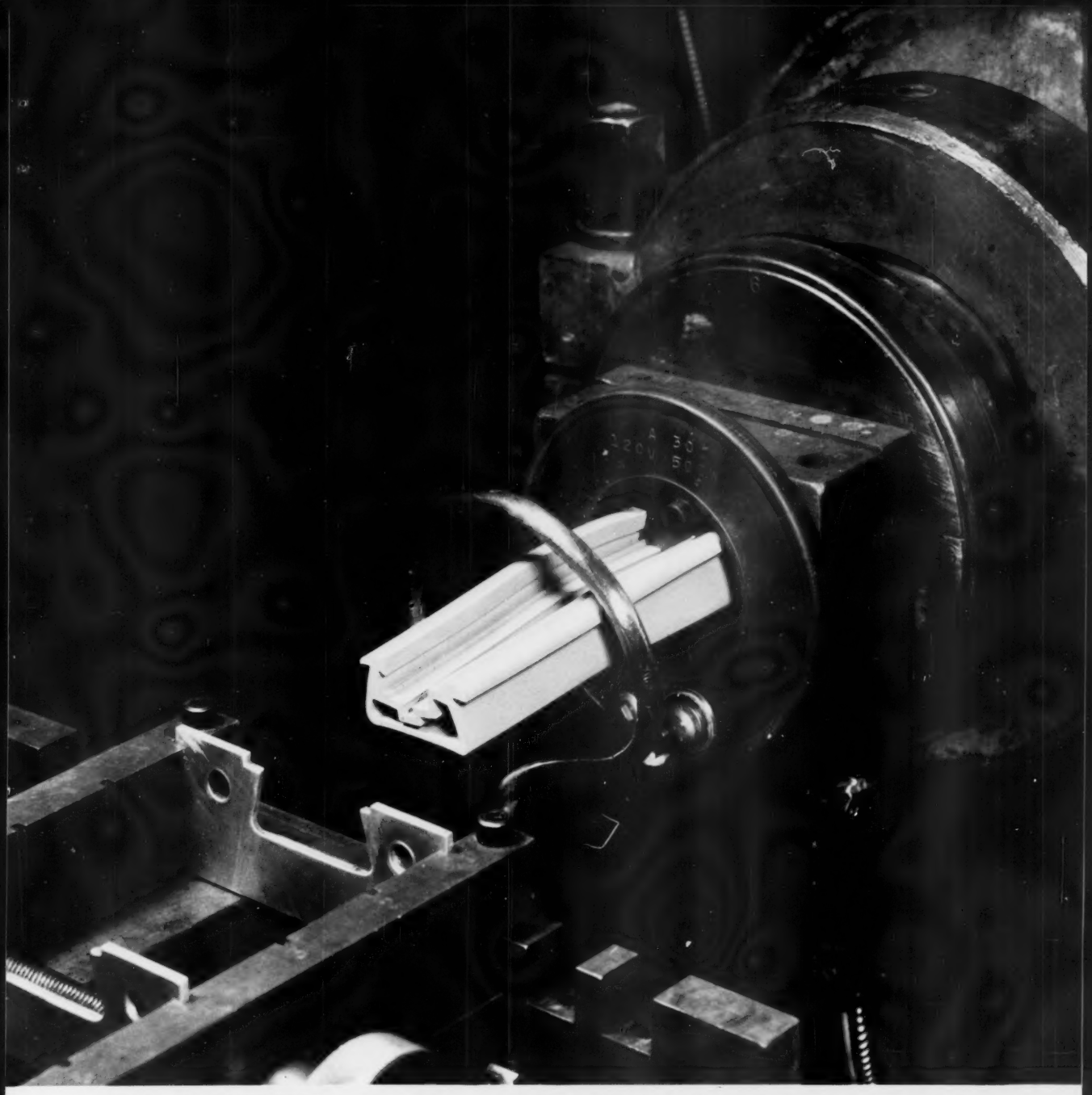
► Thiokol Chemical Corp., Trenton, N. J. has announced a lane-marking traffic button which can be bonded to any pavement surface with a special concrete adhesive. The buttons are said to be easy to apply and highly visible at night. Manufactured by Porce-Line Co. from a polysulfide compound, the markers were initially developed by the Highway Materials and Research Department of the State of California, and have shown a test performance record of better than 99.98 per cent. The markers are four inches in diameter, about 3/8-inch high, and come in white or colors. They are tough enough to be dropped on concrete without breaking, according to the company. Some of the markers are smooth and rounded, while others have impressions cast in them to make them more reflective.

Flexible Rubber Seal

► A flexible rubber seal weighing less than two pounds has been developed by U.S. Rubber Co., 1230 Avenue of the Americas, New York 20, N. Y., for use on the U.S. Air Force's Minuteman intercontinental ballistic missile. A flexible nozzle developed by the Bendix Products Division of Bendix Aviation Corp., South Bend, Ind., uses the rubber seal to confine the missile gases within the nozzle. In spite of the seal's strength, needed to contain the internal pressure, the seal is so flexible that only a small, lightweight steering device is needed for the missile, the company states. U.S. Rubber reports that the seal has withstood rigorous laboratory testing at higher temperatures and pressures than those encountered in flight and has also survived static firing tests successfully.

Coalmover Coal Belts

► Coalmover, a coal belt construction with solid edges which will not fray or fan out even under toughest abrasion, has been announced by the Manhattan Rubber Division of Raybestos-Manhattan, Inc., Passaic, N. J. The quiet-running belt is said to last longer and provide a higher co-efficient of friction than plastic covered belts. The exceptional pulley grip of Coalmover permits operation at lower tension without slip, while low stretch characteristics insure a minimum of take up adjustments. Other advantages claimed are: superior holding ability with all underground types of fasteners, fire resistant throughout, maximum rip and impact resistance, exceptional flexibility and easy, natural training at all temperatures. Coalmover is mildew-proof, moisture resistant, and certified with a Fire-Resistant Bureau of Mines acceptance designation.



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COMPOUND	A	B	C	D	E
Polysar Krynac 800	100.0	75.0	50.0	25.0	—
Polysar Krynac 804	—	25.0	50.0	75.0	100.0
MILL SHRINKAGE					
Linear shrinkage (with grain) %	45	40	20	10	5
EXTRUSION PROPERTIES					
(A) Garvey Die					
Rate (in./min.)	28	37	50	66	70
Ratio (gm./in.)	4.2	3.3	2.3	1.8	1.7
(B) ⅛" Die					
Rate (in./min.)	150	205	290	365	390
Die swell (%)	120	80	30	5	2

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Solvent resistance of stocks compounded from this base is comparable to that of the Dow Corning LS series. The photo at right above shows how little swell results when an extrusion of a stock made from LS-422 base is immersed for 24 hours in JP-4 jet fuel. Note swelling of regular silicone rubber part that was the same size at the start of the test.

Silastic LS-422 base processes easily during compounding . . . bands quickly, doesn't crumble, accepts fillers readily, can be stripped from mill rolls with a knife. Finished stocks can be molded, calendered or extruded. Even the most complex extruded shape is sharp and clear as shown in photo at above right. Write Dept. 7806 for full details.

Sample Recipes and Typical Properties

. . . For 50 Durometer Stock	
Silastic LS-422 Base	100 parts
Luperco CSF or Cadox TS-40	2 parts
Hi Sil X303	8 parts
* Durometer (Shore A)	50
Tensile Strength, psi	1000
Elongation, %	200
% Swell after 77 hrs @ 300 F in ASTM No. 3 Oil	5
. . . For 75 Durometer Stock	
Silastic LS-422 Base	100 parts
Luperco CSF or Cadox TS-40	2 parts
Hi Sil X303	5 parts
Super Neo Navacite	90 parts
* Durometer (Shore A)	75
Tensile Strength, psi	500
Elongation, %	120
% Swell after 77 hrs @ 300 F in ASTM No. 3 Oil	5

* Vulc. 5 min @ 240 F; cured 24 hrs @ 300 F.

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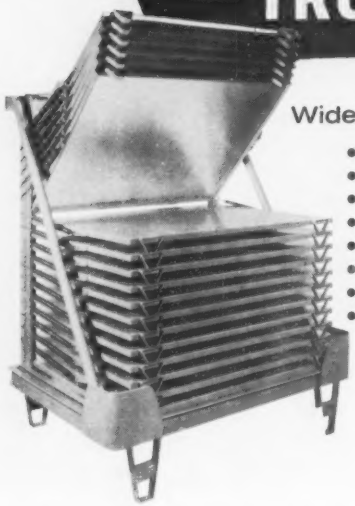

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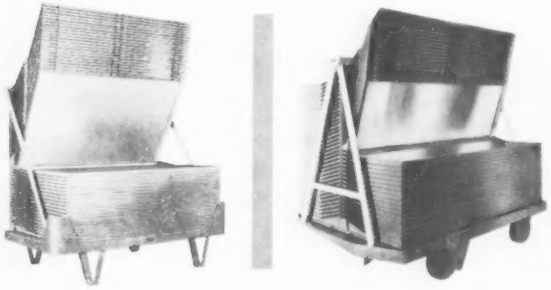

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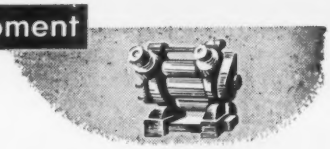
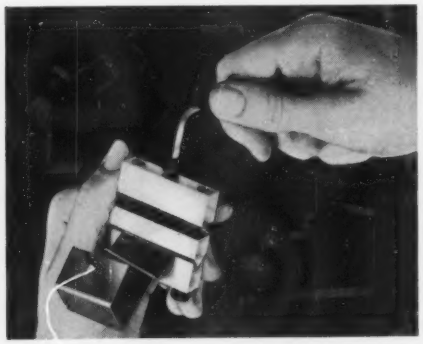


Manual Metal Shaper

►A hand tool which precision bends sheet metal and wire into virtually any shape or form has been developed by Hahn Co., 2311 Fox Hills Drive, Los Angeles 64, Calif. Called Portable Bender, the unit bends sheet metal up to ⅛ inch thick by 1¼ inch wide by any length. The tool is said to exert up to 2000 pounds of pressure to form



metal against angle and curve dies and is complete with interchangeable angle and radii dies. Working equally well on cold rolled steel, aluminum, brass, copper and wire, it can be held in the hand or clamped in a vise. It is made of heat treated steel, case hardened and zinc plated, Hahn Co. officials revealed.

Hotpack Industrial Oven

► Electric Hotpack Co., Inc., 5008 Cottman St., Philadelphia, Penna., is manufacturing a new industrial oven equipped with both front and back door openings for new convenience in loading bulky product and test items for drying, curing and other heat treating processes. The temperature range of the new oven is 95° to 500°F. Its loading ease is augmented by use of a foot operated door release, and the chamber floor is reinforced to withstand a 500 pound work load. Eye-level controls include an adjustable automatic thermostat for control within ±5°F., and an overtemperature controller that prevents chamber temperatures from exceeding thermostat settings. A high velocity blower provides even thermal levels, and heaters are nichrome wires encased in porcelain refractories. Adjustable vents aid uniform circulation and 4-inch glass insulation provides maximum heat retention. The cabinet is enameled metal with chamber finished in aluminum lacquer, and the unit comes equipped with adjustable shelves.

Plastisol Cure Tester

► An instrument for the measurement of penetration hardness and resiliency or cure of polymeric materials has been manufactured by Thwing-Albert Instrument Co., 5339 Pulaski Ave., Philadelphia, Penna. The tester was developed by the research laboratories of Continental Can Co., and is called the Continental Plastisol Cure Tester. The instrument consists of three components: a Vicat-type penetrating needle test unit; a regulated power supply for needle motion transducer; and a millivolt strip chart recorder for plotting penetration of the

needle and elastic recovery of the material. The Continental Cure Tester is said to accurately measure the cure of polymeric materials from 125 mils down to 0.7 mils thick, and minute differences in time and temperature of cure are easily detected.

Heating and Cooling Unit

►A new heating and cooling unit, designed especially for continuous mixers employed in compounding rubber, and plastics or processing other materials where accurate temperature control is essential, is being manufactured by the Chemical Machinery Division, Baker Perkins, Inc., 1000 Hess, Saginaw, Mich. The function of the unit is to heat or cool pressurized water which is circulated through the jackets of the mixer and also an extruder, if one is employed. It will control the batch temperature in the mixer and extruder even if it is necessary to add heat in some zones and remove it in others. The unit controls temperatures to within plus or minus 2 degrees, regardless of the mixer area involved. The pressurized water is handled at temperatures up to 360°F. on the outside of the tubes, and steam at 375°F., inside the tubes. The manufacturer states that with slight modification the unit may be used with heat transfer oil as the circulating medium. This would provide a maximum medium temperature of 600°F., or a total heat to the batch from both circuits of 60,000 B.t.u. per hour.

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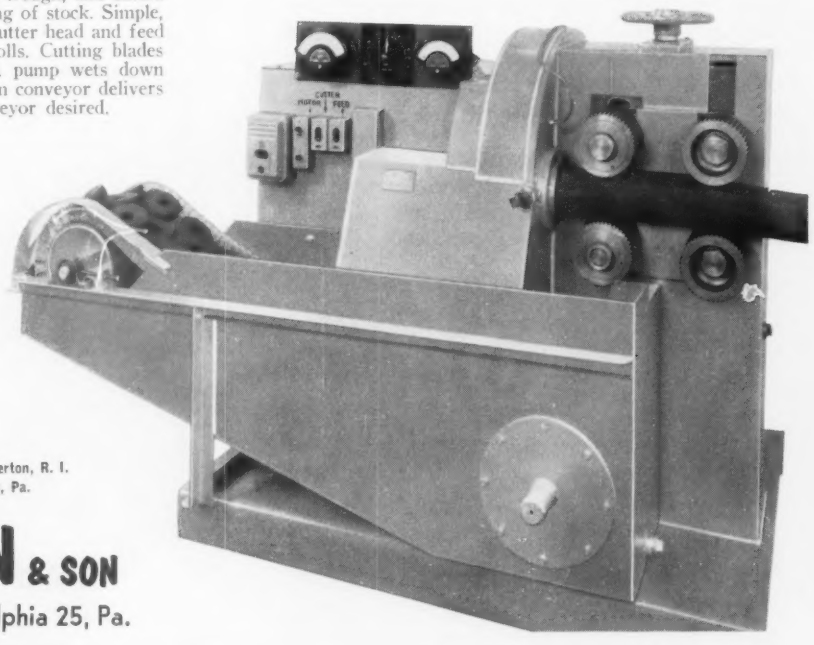

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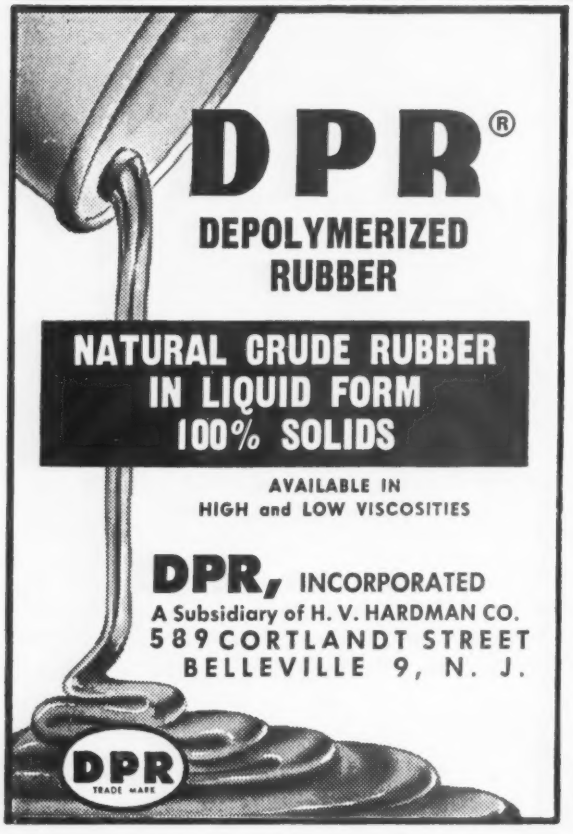


EAGLE-PICHER

...an important source of lead and zinc compounds for the rubber industry

Eagle-Picher offers you a comprehensive line of both lead and zinc compounds, produced with highest quality control standards to your exact specifications.

Our customer service and research staffs are geared to answer your special needs . . . with courteous dispatch and resourcefulness.

Zinc Oxides	Litharge
Basic White Lead Silicate	Sublimed Litharge
Basic Carbonate of White Lead	Red Lead (95%-97%-98%)
Sublimed White Lead	Sublimed Blue Lead

EAGLE EP PICHER

Since 1843

The Eagle-Picher Company
Department RA 660
Cincinnati 1, Ohio

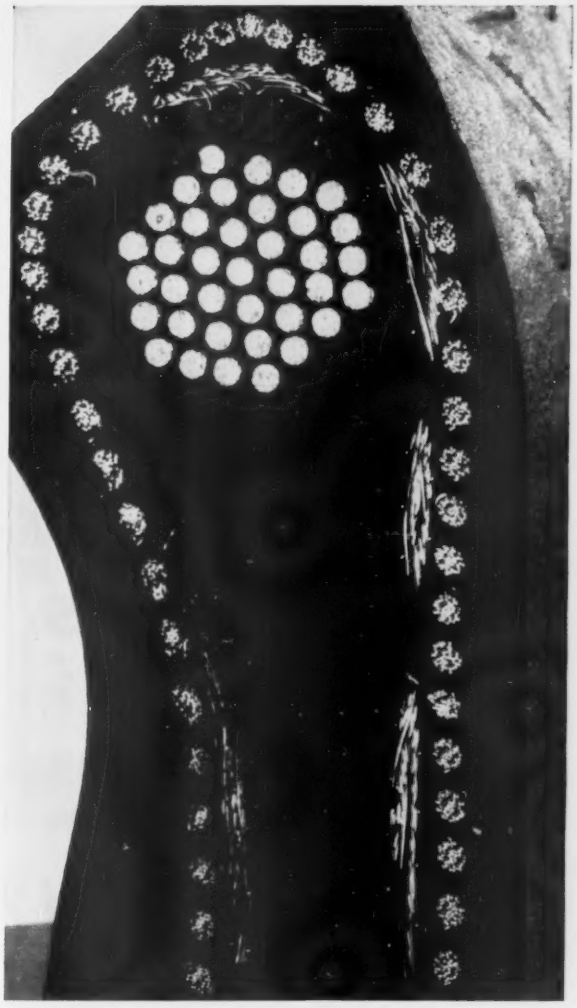
TMI Laboratory Rotomixer

►A laboratory rotomixer with mechanical characteristics said to ensure that not the smallest part of a mix can remain uncompounded has been developed by Testing Machines, Inc., 72 Jericho Turnpike, Mineola, L. I., N. Y. According to the manufacturer, Rotomixer has a unique design and rugged construction to meet the most exacting requirements for mixing small or fairly large batches. Inside dimensions of the mixing chamber are 6½ inches in diameter and 12 inches long.

The chamber is made of thick, clear plastic so the mix can be observed. It is instantly removed from the mounting. Rotomixer is reported to have exceptionally high efficiency because the mixing chamber rotates in two changing planes simultaneously. This accomplishes the complete and perfect compounding, TMI states.

Convertible Jet Mixer

► A complete line of versatile mixers for the laboratory and for production, called Barrington Convertible Jet Mixer, is available from Barrington Industries, Inc., 185 Union Avenue, Providence, R.I. The models range from ¼ hp to 15 hp sizes, ranging in mixing capacities from 3 to 3000 gallons. Each model may be converted in seconds from closed turbine to open turbine mixer, or vice versa, providing a dual application mixer in a single unit. The mixers mix, blend, disperse and homogenize materials of any viscosity which can be pumped or forced through the mixing head of the mixer. At shaft speeds of up to 8000 rpm for the laboratory models and 3600 rpm for the production units, the rotors create tremendous forces of shear and impact as the material being processed is forced between the rotor and stator as it moves through the mixing head. The distance between the rotor and the stator can be readily changed to decrease or increase the degree of shear and impact to which the material is subjected in the mixing head.



WIRE-IN-RUBBER

. . . problem solved

The hexagonal bead in the photo above is a new type of tire bead developed for use in single wire-ply tires where conventional square beads are not practical. Hexagonal bead grommets are already in metal-ply bus and truck tires now on road tests and under development.

The design and manufacture of a special bead-winding machine for producing a variety of bead-grommet cross sections is another National-Standard contribution to the rubber industry. It is typical of the many solutions to wire-in-rubber problems that have come from National-Standard engineers for over 50 years. Call National-Standard for help in solving your wire-in-rubber problems.

NS NATIONAL-STANDARD COMPANY

NATIONAL-STANDARD COMPANY

Niles, Michigan

Mr. Du adds the
"SATIN-SHEEN"
TO RUBBER
PRODUCTS!
They sell on sight!
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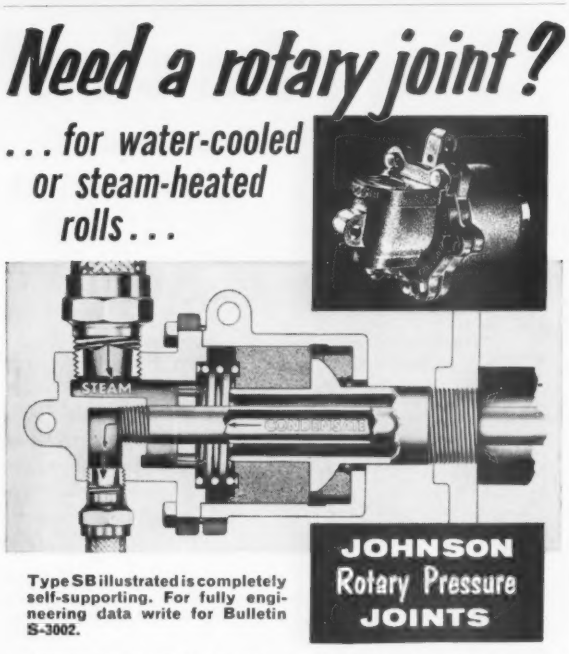
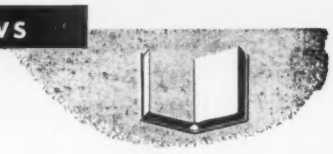
Self-serve merchandising demands products that look better, sell faster. RuBARS add a new richness, new velvety-sheen finish. Clean, convenient, economical — they promote perfect mold fill-out; assure quick, sharp mold release; reduce cracks, fissures; ease extrusions. Instant mold release, too. Suitable for lightest stocks. Ask your DuBois Representative about other compounds for industry.
DuBois Chemicals, Inc. • Broadway at 7th • Cincinnati 2, Ohio


Need a rotary joint?
. . . for water-cooled
or steam-heated
rolls . . .
STEAM
CONDENSATE
JOHNSON
Rotary Pressure
JOINTS
Type SB illustrated is completely self-supporting. For fully engineering data write for Bulletin S-3002.
Johnson started the whole idea . . . is far ahead in know-how, available types and sizes. Johnson Joints are completely packless, need no lubrication or adjustment. Used on dryer rolls, mills, waxers, calenders, slashers, printing presses, etc.—handling steam, water, hot heat transfer oils, Dowtherm, Mansanto Aroclors, etc. Actually serving under pressures as high as 2400 psi. Sizes up to 8".
THE JOHNSON CORPORATION
868 Wood St., Three Rivers, Michigan

Reviews



Rubber to Metal Bonding. By S. Buchan. Published by Crosby Lockwood & Sons Ltd., London, England. Distributed in U.S. by Palmerton Publishing Co., Inc., 101 W. 31st Street, New York 1, N.Y. 5½ x 8½ in. 296 pp. $7.50.

There is probably no phase of rubber technology that is so much more art than science than that dealing with the bonding of rubber to metallic surfaces. There is no one more concerned about this than S. Buchan.

In the first edition of his book, "Rubber to Metal Bonding," published in 1948, Dr. Buchan succeeded admirably in introducing some order into this rapidly growing segment of the rubber industry. However, during the past decade, many new techniques have been developed, so that a second, revised edition of this excellent work is welcome, indeed.

The author's task has not been an easy one. Despite the considerable amount of research and development work that has been carried out on bonding, little of it has been published. It is significant that there are only about sixty more references in the bibliography of the 1959 edition than in the 1948 publication, and most of these are bulletins put out by the manufacturers of the new proprietary bonding agents. Therefore, the various theories that are currently being advanced lack the certainty and balance that can only be obtained by assimilating results and conclusions from a variety of sources. The chapters dealing with the brass plating technique, which constitute one-half of the book, have been reorganized to present a very thorough and comprehensive treatise on the subject. It is obvious that the author knows this technique exceedingly well and deals with it in a very straightforward manner.

Dr. Buchan outlines in considerable detail how to set up a brass-plating plant, giving special attention to the reasons for each step. The necessity for careful control and constant attention to the various operations involved is continually emphasized, even to the point of devoting a separate chapter to methods of analysis, and another one to a discussion of process control. Satisfactory bonds to brass-plate require producing a deposit of brass with uniformly good chemical and physical properties, as well as employing properly compounded rubber stocks. The compounding problem is dealt with very thoroughly in two carefully documented chapters. The design of molds used in the production of rubber-to-metal bonded assemblies has long been recognized as a very important phase of high manufacturing quality for bonded parts. The chapter discussing the five standard methods of molding and their relationship to bonding will be of great help to the reader in recognizing the many pitfalls that must be avoided here.

Several chapters discuss the examination of brass deposits, in an attempt to clarify the role of the brass-plate's physical state in bonding, and the mechanisms responsible for the formation of the actual rubber-to-metal bond. Although the author does not permit himself the luxury of any but general conclusions, his discussions should aid materially to achieve a better understanding of the properties of a rubber-to-brass bond. Those chapters covering the chemical bonding agents have been greatly expanded in this revised edition, and over fifty pages of new material have been added. It is unfortunate that much of this information had to be obtained from manufacturers' bulletins, and could only be discussed in general terms. Dr. Buchan is obviously a staunch supporter of the brass-plate bonding technique, but has in this second edition approached the subject of applying chemi-

cal bonding agents very objectively, recognizing the rapidly growing importance of these materials. Since most of them are proprietary materials of undivulged composition, their classification has been difficult.

The author considers bonding techniques from a historical viewpoint, starting his discussion with ebonite, continuing with other thermoplastic materials, then giving considerable attention to the halogenated rubber derivatives and the isocyanates. His chapter on some of the more popular, present-day adhesives is, of necessity, very general since, as stated above, little or no information is available concerning their composition. For the sake of completeness, a chapter on bonding previously vulcanized rubber is also included. A chapter on the testing of bonded units has been added. While this subject is treated quite thoroughly in view of present-day knowledge, the author's conclusions emphasize the need for better correlation between laboratory results and service life.

Drawing on his extensive experience in the field of bonding rubber to metal, the author has produced a very comprehensive, authoritative, and at the same time readable, book. It is well organized and indexed, and the numerous illustrations add much to the text. This is the sort of book that will inform the reader the first time it is read, and will continue to be a great asset as a reference work in time to come. It is strongly recommended to both the chemist and the engineer concerned in any way with bonded rubber-metal units. **F.W.G.**

•

Die Polarchemie des Kautschuks und der Kolloide (Polar Chemistry of Rubber and Colloids). By Heinrich Feuchter. 78 pp. Published by Heinrich Feuchter. Produced and distributed by A. W. Gentner Verlag, Stuttgart, Germany. DM 12.

This is a rather strange little book in which the author attempts to solve not only the nature of rubber but of the whole universe, of culture and politics. Some of the ideas advanced appear to be borrowed from the alchemists and some from the old Greek philosophers. The author attempts to reduce all natural phenomena to a dualistic system but, on the other hand, seems to be confused about dimensions by repeatedly talking about the four dimensions of space, probably thinking of up and down and left and right as dimensions. For instance, "spharomerie," whatever that may be, is described as a specific property of rubber and colloids, and the ability to form structures in four-space dimensions. The first thought of this reviewer, when glancing through this book, was how was it possible for the author to find a publisher. But a second look at the title page answered the question. He published it himself.

F. R.

•

Directory of New England Manufacturers: 1960. Published by George D. Hall Co., 20 Kilby St., Boston 9, Mass. 7½ x 11 in. 788 pp. $45.

From "Abrasives" to "Zippers," almost everything manufactured in New England—including maple syrup and Moxie—is listed in this new edition of a manufacturers' directory that covers some 13,000 companies in Maine, Vermont, New Hampshire, Massachusetts, Rhode Island and Connecticut.

Company listings are given in four sections: alphabetically, geographically, by product and by brand name. The information was supplied and checked by the manufacturers themselves, so that purchasers, suppliers and salesmen will find accurate, detailed and up-to-date references. Such a directory's value for the compilation of mailing lists or for the most effectively planned sales itineraries is self-evident. Care has been taken to include

WIRE-IN-RUBBER

. . . problem solved

The polyethylene bead wire package shown above is another new development from National-Standard that permits more extended storage of bead wire without danger of rust or corrosion.

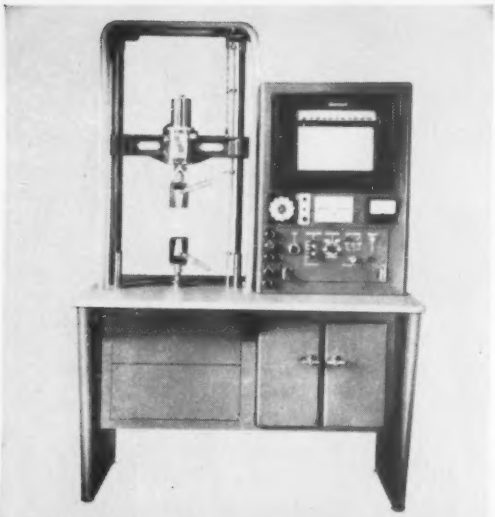
Extensive testing of the new package over many months in highly humid environmental chambers, without any evidence of wire corrosion, proved the new package superiority over old-style wrappers . . . means tire manufacturers can store bead wire for months without fear of damage.

The solution to this special wire-in-rubber problem is another National-Standard contribution to the rubber industry. Call National-Standard for help in solving your wire-in-rubber problems.

NS NATIONAL-STANDARD COMPANY

NATIONAL-STANDARD COMPANY

Niles, Michigan



NEW PUSH-BUTTON ACCURACY FOR TENSILE TESTING!

Test high and low elongation, tear strength, and other physical qualities of your rubber products on the versatile Scott Model CRE Constant-Rate-of-Extension electronic tester. New push-button controls make rubber testing a simple, accurate operation . . . offer greater-than-ever operating convenience and testing economies. Ultra-precise *electronic weighing* system provides an infinite variety of crosshead speeds . . . wide selection of test load ranges to 1000 lbs. . . . instant response to rapidly fluctuating loads. Automatic gauge compensation also provides *direct-in-psi* readings for testing elastomeric stress.

The ratio of crosshead speed to recorder chart speed is adjustable over a wide range, giving ample magnification for practically all materials. Elastomer pipping circuit provides manually-controlled representation of visually-observed specimen elongation. A new Scott clamp-locking assembly also reduces clamp-changing time to a *matter of seconds!* The Model CRE makes use of *all* Scott clamps and fixtures to meet ASTM, ISO, government and rubber industry test methods.

SCOTT TESTERS FOR RUBBER

PUSH-BUTTON AUTOMATION FOR VISCOSITY TESTING!

Determine viscosity, scorch and cure characteristics of rubber and other elastomers with the new, improved Scott Model STI Mooney Viscometer plus Viscosity and Temperature Recorders. Fingertip, pneumatic-powered controls close two-part sample area uniformly — without effort or adjustments. Precise temperature control within ±½°F. at any set temperature to 450°F. Fast-setting spring adjustment saves time, facilitates calibration. New fully-enclosed gear box assures steady readings . . . easier maintenance, fewer repairs, less downtime. Scott Shearing Disc Viscometers — and *only* Scott — are universally accepted as meeting requirements of ASTM Designation D1646 (formerly D927 and D1077) and ISO/TC45 Proposals 411 and 440.

QUICK-CHANGE SCOTT CLAMPS AND FIXTURES

Z-1 CLAMP FOR **TENSILE TESTING**

One of the industry's most popular clamps for general purpose rubber testing. This is a self-closing clamp developed by the Gas Defense Service, U.S.A. for testing gum and soft stocks. Roll is ⅜" in diameter and 1¾" in length.

LORD **ADHESION** FIXTURE

Designed by the Lord Manufacturing Co., Erie, Pa., for evaluating rubber-to-metal bonding strength. Adaptable to Scott clamps, this fixture accepts a metal backing plate and pivots on a nylon bearing to insure positive alignment during stripping of 1" wide rubber sample. Meets ASTM Method of Test D-429.

RING TEST SPOOLS

This Scott clamp is used for testing ring-shaped rubber samples and loops of rubber thread on a sled base. Spools are ball-bearing mounted . . . lower spool with chain-driven sprocket revolves as strain is applied, for even tension on both sides of loop or ring. Capacity 150 lbs.

WRITE FOR COMPLETE DETAILS ON MODEL CRE . . . MODEL STI . . . SCOTT CLAMPS . . . AND OTHER SCOTT TESTERS DESIGNED FOR RUBBER AND ELASTOMER PRODUCTS

SCOTT TESTERS

THE SURE TEST . . . SCOTT!

SCOTT TESTERS, INC.
85 Blackstone Street
Providence, Rhode Island

the names of top executives, about 25,000 of them, which should facilitate business contacts even more.

Of particular interest to the rubber industry are the two pages of company listings for that field, broken down by makers of belting, cement, clothing, coated fabrics, flooring, footwear, etc. That there are only five firms mentioned as producers of tires gives one pause to reflect upon the accident of history which located the rubber capital at Akron, when it would have been not at all unlikely to have the trade follow the early automobile makers to Connecticut. Despite the present preponderance of the Midwest, with the South and Far West coming up strong, New England is not only maintaining its share of the mechanical and footwear business against underpriced imports, but is also firmly established in the engineering sector as the industry enters the missile age. The region's adjustment to the demand for precision machinery and products is shown graphically by the revised entries of this remarkably comprehensive directory.

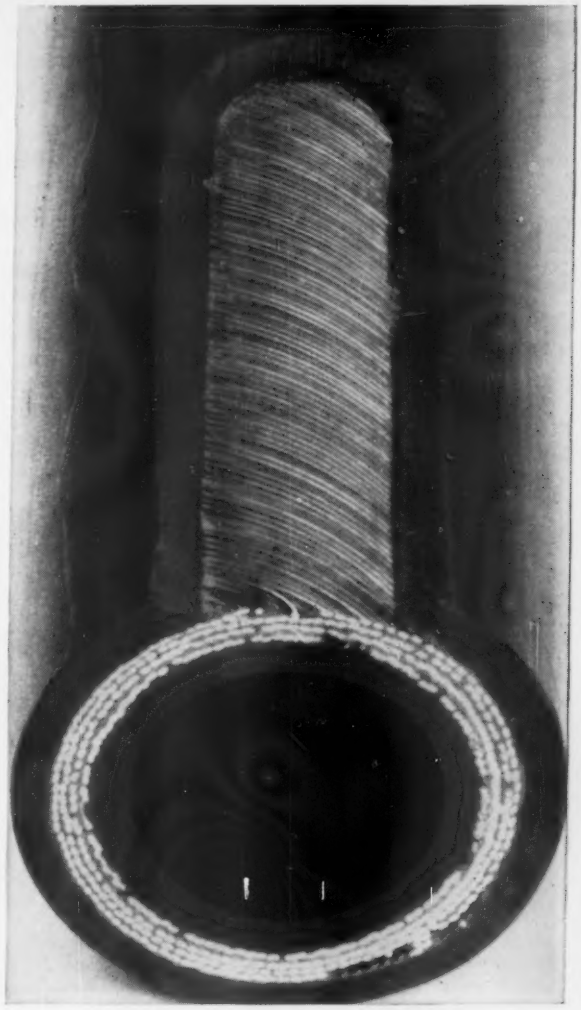
BOOKLETS, CATALOGS, etc.

Polyurethane Foams: Their Contribution to Heat Insulation. (Vol. LVI). Dyestuffs Division, Imperial Chemical Industries Ltd., Hexagon House, Blackley, Manchester 9, England.

Reprinted from the proceedings of the Institute of Refrigeration, this booklet refers to particular experiments and tests and contains numerous tables. Different sections deal with such areas as: hazards associated with various types of polyisocyanates, toxicity hazards in spraying polyurethane foams, toxicity of pyrolysis products, production of foam, the properties of polyurethane foams, protection against corrosion, and use of foam for heat insulation.

Production of Urethane Foams. Isocyanate Products, Inc., 900 Wilmington Road, New Castle, Del. 8½ x 11 in. 8 pp.

Materials, equipment, design assistance and engineering know-how for the production of high-quality urethane foams are described in this booklet. It deals with the use of flexible and rigid foam-in-place resins for low-temperature insulation, shockproof packaging, comfort cushioning, marine flotation, encapsulation of electronic components and many other applications.



WIRE-IN-RUBBER

. . . problem solved

The ¾" high-pressure hose shown above has a 4-spiral wrap of high-tensile .012" liquor finish, high-carbon steel wire. This spiral wrap design is a new development by hose engineers that provides good fatigue qualities and high bursting strength for such critical applications as jet-aircraft hydraulic systems. The N-S special liquor finish on the wire provides better wire-to-rubber adhesion than old standard liquor finishes. The solution to this special wire-in-rubber problem is another National-Standard contribution to the rubber industry. Call National-Standard for help in solving your wire-in-rubber problems.

NS NATIONAL-STANDARD COMPANY

NATIONAL-STANDARD COMPANY

Niles, Michigan

MARKET REPORTS

TRENDS
NEWS
PRICES

Natural Rubber

Since our last report (May 2), the price of natural rubber on the New York Commodity Exchange has moved in the extremely wide range of 525 points, high for the period being 45.75c reached on May 17, and a low of 40.50c on May 2 and 3. The average price of spot rubber for the month of May was a healthy 43.62c based on 21 trading days. This compares with an average of 40.35c from the previous month.

On the final trading day in May the New York market closed on a steady note, although analysts were uncertain about even the near future as they tried to puzzle out causes for the recent "squeeze" in Singapore—the most severe to have occurred in over four years. What made it particularly paradoxical was that it came at a time when stocks were building up and Malayan exports had been running at their lowest levels for 18 months, due to slackening demand.

The May 30 edition of *The London Financial Times* saw three major factors at work behind the economic enigma: first, the general rise in rubber production this year had not been accompanied by a proportionate rise in output of the first grade material which determines most market prices; second, large Communist purchases are possibly being arranged in advance without anyone's knowledge; finally, the Singapore market has a well deserved reputation as one of the most speculative in the world, and it would surprise no one to learn that Chinese dealers kept back large supplies of grade one rubber during the recent tightness.

Stockpile Developments

With the final softening of markets spreading from Malaya to London and New York, traders turned to consider the domestic scene. Paramount here was final Congressional approval of the stockpile disposal program for 470,000 tons of rubber over the next nine years. At the same time, the General Services Administration announced that 27,995 long tons of No. 1 ribbed smoked sheet was being offered for sale on an optional basis, under "as is" or guaranteed terms. Lack of market reaction to the announcement, coupled with some optimistic reports (see *Synthetic Rubber*), sent futures on their latest upward spiral.

The auto industry supplied further encouragement by scheduling a June output of more than 600,000 units. This would bring half-year production to 3.8 million, making a 6.5 million car year a distinct possibility. If it should transpire, the figure would be the highest since the record 7.92 million output in 1955. Sales were picking up accordingly, with many assembly plants going back to a 6-day work week.

A boom in the retread market was being forecast by J. W. Hodgson, a Firestone executive. He predicted 40 million retreads in 1960 which would mean a new annual peak in this sector as well.

NEW YORK, JUNE 1, 1960

Price Data

Closing Rubber Prices on New York Commodity Exchange

FROM MAY 1 TO MAY 31

May	Spot	July	Sept.	Nov.	Sales
1	....	....	....	....	..
2	40.50	39.55	39.00	38.40	47
3	40.50	39.60	39.20	38.60	36
4	41.50	40.40	39.80	39.27	118
5	42.50	40.45	39.70	39.15	202
6	41.50	40.30	39.60	39.05	49
7	....	....	....	....	..
8	....	....	....	....	..
9	42.50	40.50	39.62	39.10	55
10	42.50	41.02	40.05	39.40	34
11	43.50	41.97	40.80	40.10	112
12	43.50	41.75	40.55	39.90	178
13	44.25	42.20	40.72	39.90	56
14	....	....	....	....	..
15	....	....	....	....	..
16	44.00	42.45	41.25	40.30	25
17	45.75	43.50	41.95	41.10	81
18	45.50	43.10	41.50	40.50	63
19	45.25	43.25	41.50	40.35	44
20	45.00	42.80	40.76	39.90	50
21	....	....	....	....	..
22	....	....	....	....	..
23	44.50	42.15	40.65	39.85	48
24	44.25	41.80	40.45	39.56	88
25	45.00	42.10	40.80	39.95	27
26	45.00	41.85	40.60	39.65	39
27	45.00	42.30	40.90	40.00	28
28	....	....	....	....	..
29	....	....	....	....	..
30	....	....	....	....	..
31	44.00	42.65	41.15	40.20	24

Outside Market

No. 1 Ribbed Smoked Sheets:	
Spot	.44
July	.42½
Aug.	.42
Thin Latex Crepe:	
Spot	.48¾
Thin Brown Crepe, No. 2	.40¾
Flat Bark Crepe	.35½

London Market
(Standard Smoked Sheets)

July	43.35 — 43.64
Oct.-Dec.	40.29 — 40.58

Singapore Market
(Standard Smoked Sheets)

July	40.67 — 40.75

Middling Upland Quotations

	Apr. 29	May 31		
	Close	High	Low	Close
July	32.93	32.87	32.77	32.77
Oct.	31.07	31.02	31.01	31.00
Dec.	30.84	31.10	31.10	31.06

Notes & Quotes

"If it were not for the development and subsequent improvement of synthetic rubber for use in tires," G. R. Cuthbertson, vice-president of U.S. Rubber, told a New York meeting of financial analysts, "the motoring public would have to pay nearly $1 billion more a year for tires." The rubber executive said that savings, directly and through added tread life, amounted to $14 a vehicle. It could be regarded as a 350 per cent return on the $262 million spent by the government to develop synthetics in the '40's.

Synthetic Rubber

Although not up to the record high set in March, production of synthetic rubber during the past month reached a respectable total of 121,012 long tons, only about 9,000 tons below the previous monthly peak. April also saw a proportionate widening of synthetic's margin over natural as it established a new mark of 68.18 per cent of all new rubber consumption.

Consumption of all synthetic types amounted to 90,480 long tons, according to Rubber Manufacturers Association figures. This brought the total for the first four months to 376,543, or more than 24,000 long tons above the same period of 1959. The current percentage of new consumption, 67.44, likewise overshadowed the January-April, 1959, average of 64.88 per cent.

In short, synthetic is doing better than ever: production capacity rising, its share of total consumption steadily increasing, and new varieties passing from the developmental to the commercial stage. If 1960 will be a merely "good" year rather than the "boom" period envisioned earlier, prevailing economic forecasts for a new annual consumption level of 1 million long tons may easily prove to err on the conservative side.

Bulls vs. Bears

While rose-colored glasses were being passed around in financial quarters which foresaw a supply shortage for natural rubber developing late this year, other pundits predicted a small surplus or, at the least, a levelling off in worldwide demand. The opposing standpoints became more clearly demarcated at the time of the Big Four debacle in Paris. When the Conference broke off, some speculators here and abroad were quick to rush in, under the apparent impression that a chillier turn to the Cold War would heighten rubber's strategic value, as in past periods of tension.

The unwarranted nature of this assumption was indicated by a rapid softening of the market during the last week of May. An article in the *Journal of Commerce* pointed out once more that synthetics, available in greater quantity and quality, spelled the disappearance of rubber from the list of war commodities.

Some sources, especially in Great Britain, insisted that the outlook was decidely "bullish," quite apart from international tensions or dismantling of stockpiles. These economists quoted statistics showing over-all consumption rising 16 per cent during the past decade, production increasing only 11 per cent. Projecting this curve would mean a 40,000-ton deficit in the offing.

The International Rubber Study Group, for one, refused to share such optimism. Its latest estimates were: 2.1 million tons of natural to be consumed world-wide in 1960, leaving a surplus of 35,000 tons. All agreed Russia's planned synthetic capacity of 1.5 million tons by 1965 would affect long range prospects.

Effective May 31st, the name of Enjay Company, Inc. changed to Enjay Chemical Company, a division of Humble Oil & Refining Company. Enjay Chemical Company will continue to serve modern industry with a complete line of petrochemicals, including Butyl rubber, solvents, resins, plastics, and additive compounds for fuels and lubricants. As a division of Humble Oil & Refining Company, the company is determined to become even more important in the growing petrochemical field.

As the pioneer in petrochemicals, and a leader in the marketing of chemical raw materials, it has always been the policy of Enjay to help customers develop new products and improve existing ones. Enjay now has ten sales offices — including the new one recently added at Houston, Texas — standing ready to offer immediate handling of product orders and requests for technical service. Strategically located distribution points also offer benefits of prompt deliveries.

Enjay Chemical Company looks forward to giving its thousands of customers continued and unequalled technical service . . . backed by one of the world's largest research organizations.

HOME OFFICE:
15 West 51st Street, New York 19, N. Y.

OTHER OFFICES:

Akron	*Boston*	*Charlotte*
Chicago	*Detroit*	*Houston*
Los Angeles	*New Orleans*	*Tulsa*

EXCITING NEW PRODUCTS THROUGH PETRO-CHEMISTRY

ENJAY CHEMICAL COMPANY

A DIVISION OF HUMBLE OIL & REFINING COMPANY

ENJAY
PETROCHEMICALS

Dry Rubber

(per pound carload)

Butadiene-Acrylonitrile Types

Butaprene NF	.4900
Butaprene NH	.6500
Butaprene NL	.5000
Butaprene NXM	.5800
Chemigum N1NS	.6400
Chemigum N3NS and N5	.5800
Chemigum N6	.5000
Chemigum N6B	.5000
Chemigum N7	.5000
Chemigum N8	.5000
Chemigum N600	.5000
Herecol N-33	.6800
Hycar 1001 and 1041	.5800
Hycar 1002	.5000
Hycar 1014	.6000
Hycar 1042 and 1043	.5000
Hycar 1051	.5800
Hycar 1052	.5000
Hycar 1053	.5000
Hycar 1072	.6400
Hycar 1203	.4600
Hycar 1312	.5000
Hycar 1411	.6200
Hycar 1432	.5900
Hycar 1441	.6200
Paracril AJ	.4850
Paracril B and BJ	.5000
Paracril BLT and BJLT	.5000
Paracril C and CLT	.5800
Paracril CV	.6300
Paracril D	.6500
Paracril 18-80	.6000
Paracril OZO	.4600
Polysar Krynac 800	.5000
Polysar Krynac 801	.5800
Polysar Krynac 802	.5000
Polysar Krynac 803	.5000

Butadiene-Styrene Types

Ameripol 1000	.2410
Ameripol 1001	.2410
Ameripol 1002	.2435
Ameripol 1006	.2410
Ameripol 1006 (crumb)	.2475
Ameripol 1007	.2410
Ameripol 1009	.2475
Ameripol 1009 (crumb)	.2590
Ameripol 1011	.2475
Ameripol 1012	.2425
Ameripol 1012 (crumb)	.2490
Ameripol 1013	.2410
Ameripol 1013 (crumb)	.2615
Ameripol 1500 and 1501	.2410
Ameripol 1502	.2410
Ameripol 1605	.1900
Ameripol 1703	.2060
Ameripol 1705	.2035
Ameripol 1707	.1910
Ameripol 1708	.1910
Ameripol 1710	.1885
Ameripol 1712	.1885
Ameripol 1805	.1550
Ameripol 4600	.2410
Ameripol 4650	.1820
Ameripol 4651	.1770
Ameripol 4652	.1425
Ameripol 4654	.1870
Ameripol 4655	.1820
Ameripol 4659	.1820
Ameripol 4660	.1870
Ameripol 4700	.1750
Ameripol 4750	.1545
Ameripol 4751	.1400
Ameripol 4752	.1600
Ameripol 4753	.1480
Ameripol 4760	.1576
Ameripol 4759	.1600
Ameripol 4761	.1710
ASRC 1000	.2410
ASRC 1001 and 1004	.2410
ASRC 1006	.2410
ASRC 1009	.2475
ASRC 1018	.2700
ASRC 1019	.2650
ASRC 1500	.2410
ASRC 1502	.2410
ASRC 1503	.2625
ASRC 1703	.2060
ASRC 1708	.1910
ASRC 1712	.1885
ASRC 1713	.1750
TSRC 3105 and 3106	.2410
ASRC 3110	.2600
Baytown 1600	.1930
Baytown 1601	.1930
Baytown 1602	.1930
Baytown 1801	.1760
Baytown 1803	.1740
C-102 (Shell)	.2300
Carbomix 3750	.1820
Carbomix 3751	.1845
Carbomix 3752	.1845
Carbomix 3753	.1640
Carbomix 3756	.1569
Carbomix 3757	.1480
Carbomix 3758	.1545
Carbomix 3760	.1496
CB-102 (Shell)	.1850
Copo 1006	.2410
Copo 1500	.2410
Copo 1502	.2410
Copo 1505-NS	.2610
Copo 1507	.2410
Copo 1712	.1885
Copo 1713	.1750
Copo 1714	.1725
Copo 1773	.2060
Copo 1778	.1910
Copo 2000	.2775
Copo 3700	.1725
Copo 3701	.1750
Copo 3900	.2310
FR-S 146	.2410
FR-S 158	.3000
FR-S 173	.2060
FR-S 178	.1910
FR-S 181 and 182	.2410
FR-S 184	.1885
FR-S 1000	.2410
FR-S 1001	.1410
FR-S 1004 and 1006	.2410
FR-S 1007	.2410
FR-S 1009	.2475
FR-S 1010	.2600
FR-S 1012	.2425
FR-S 1013	.2410
FR-S 1014	.2810
FR-S 1500	.2410
FR-S 1502	.2410
FR-S 1703	.2060
FR-S 1710	.1885
FR-S 1712	.1885
Gentro 1500	.2410
Gentro 1712	.1885
Gentro-Jet 9152	.2080
Gentro-Jet 9153	.1820
Gentro-Jet 9154	.1845
Gentro-Jet 9250	.1580
Gentro-Jet 9251	.1640
Gentro-Jet 9252	.1670
Gentro-Jet 9275	.1500
Naugapol 1016	.2650
Naugapol 1018	.2700
Naugapol 1019	.2650
Naugapol 1022	.2950
Naugapol 1023	.3150
Naugapol 1503	.2625
Naugapol 1504	.0330
Naugapol 6003	.2700
Naugapol 6100	.3100
OB-102 (Shell)	.1825
OB-104 (Shell)	.1475
OB-106 (Shell)	.1510
OB-110 (Shell)	.1410
OB-111 (Shell)	.1540
OB-113C (Shell)	.1750
OB-114C (Shell)	.1420
OB-116 (Shell)	.1810
Philprene 1000	.2410
Philprene 1001	.2410
Philprene 1006	.2410
Philprene 1009	.2475
Philprene 1018	.2700
Philprene 1019	.2650
Philprene 1500 and 1502	.2410
Philprene 1503	.2625
Philprene 1601	.1930
Philprene 1603	.1960
Philprene 1605	.1900
Philprene 1606	.1820
Philprene 1703	.2060
Philprene 1708	.1910
Philprene 1712	.1885
Philprene 1803	.1740
Philprene 1805	.1550
Plioflex 1006	.2410
Plioflex 1500C	.2410
Plioflex 1502	.2410
Plioflex 1507	.2410
Plioflex 1508	.2410
Plioflex 1510	.2410
Plioflex 1710C and 1712C	.1885
Plioflex 1713	.1750
Plioflex 1714C	.1725
Plioflex 1773	.2060
Plioflex 1778	.1910
Polysar Kryflex 200	.2510
Polysar Krylene	.2410
Polysar Krylene NS	.2410
Polysar Krynol 651	.1885
Polysar Krynol 652	.1910
Polysar S and S-50	.2410
Polysar S-X 371	.2550
Polysar SS-250	.2875
S-1000	.2300
S-1002	.2325
S-1006	.2300
S-1009	.2400
S-1011	.2325
S-1013	.2300
S-1500	.2300
S-1502	.2300
S-1509	.2300
S-1600	.1825
S-1602	.1825
S-1604	.1825
S-1605	.1800
S-1606	.1750
S-1607	.1750
S-1703	.1950
S-1707	.1800
S-1709	.1775
S-1710	.1775
S-1712	.1775
S-1778	.1800
S-1800	.1475
S-1802	.1410
S-1803	.1650
S-1804	.1750
S-1806	.1510
S-1807	.1540
S-1808	.1420
S-7652	.1875
S-7701	.1850
SP-103 (Shell)	.2900
Synpol 1000 and 1001	.2410
Synpol 1002	.2435
Synpol 1006	.2410
Synpol 1007	.2410
Synpol 1009	.2475
Synpol 1012	.2425
Synpol 1013	.2410
Synpol 1061	.2410
Synpol 1500	.2410
Synpol 1502	.2410
Synpol 1551	.2410
Synpol 1703	.2060
Synpol 1707	.1910
Synpol 1708	.1910
Synpol 1712	.1885
Synpol 8103	.2401
Synpol 8151	.1820
Synpol 8152	.1860
Synpol 8200	.1910
Synpol 8201	.1750
Synpol 8202	.1725
Synpol 8208	.1750
Synpol 8255	.1480
Synpol 8253	.1584
Synpol 8254	.1545
Synpol 8266	.1598
Synpol 8267	.1640

Butyl Rubbers

Enjay Butyl 035 and 150	.2300
Enjay Butyl 165 NS	.2400
Enjay Butyl 215	.2300
Enjay Butyl 217	.2300
Enjay Butyl 218	.2300
Enjay Butyl 268 NS	.2400
Enjay Butyl 325	.2300
Enjay Butyl 365 NS	.2400
Polysar Butyl 100	.2450
Polysar Butyl 101	.2775
Polysar Butyl 200 and 300	.2450
Polysar Butyl 301	.2550
Polysar Butyl 400	.2450

Chlorosulfonated Polyethylene

Hypalon 20	.4700
Hypalon 30	.6000
Hypalon 40	.5000

Fluoroelastomers

Kel-F Fluorel	$15.00
Kel-F 3700 and 5500	$16.00
Vitron A and A-HV	$10.00
Viton B	$13.00

Neoprene

(prices f.o.b.)

Neoprene Types AC and CG	.5500
Neoprene Type AD	.5500
Neoprene Type FB	.6500
Neoprene Type GN	.4100
Neoprene Type GN-A	.4100
Neoprene Type GRT	.4200
Neoprene Type KNR	.7500
Neoprene Type S	.4200
Neoprene Type W	.3900
Neoprene Type WB	.4100
Neoprene Type WHV	.3900
Neoprene Type WRT	.4500
Neoprene Type WX	.4100

SYNTHETIC RUBBER POLYMERS

Polysulfide Rubbers

	(prices f.o.b.)
Thiokol Type A	.5000 [3]
Thiokol Type FA	.6900 [3]
Thiokol Type ST	1.2500 [3]

Silicone Rubbers*

	(prices f.o.b.)
GE (compounded)	2.50 [3]
GE Silicone Gum (not compounded)	4.00 [3]
Silastic (compounded)	2.50 [3]
Silastic (gums)	4.00 [3]
Union Carbide (gums)	4.00 [3]
Union Carbide (compounds)	2.50 [3]

Latex

(per pound carload)

Butadiene-Acrylonitrile Types

Butaprene N-300	.4600 [1]
Butaprene N-400 and N-401	.5400 [1]
Chemigum 200	.4800 [2]
Chemigum 235	.5300 [2]
Chemigum 236	.5300 [2]
Chemigum 245	.4500 [2]
Chemigum 246	.4500 [2]
Chemigum 247	.4500 [2]
Chemigum 248	.4500 [2]
Hycar 1512	.4500 [2]
Hycar 1551	.5300 [2]
Hycar 1552	.4500 [2]
Hycar 1561	.5300 [2]
Hycar 1562	.4500 [2]
Hycar 1571	.5300 [2]
Hycar 1572	.4500 [2]
Hycar 1577	.4500 [2]
Nitrex 2612	.4500 [1]
Nitrex 2616	.5300 [1]
Nitrex 2620	.4500 [1]
Nitrex 2625	.4500 [1]
Tylac 640	.4500 [1]
Tylac 740	.4900 [1]
Tylac 840	.5300 [1]
Tylac 1640	.5400 [1]
Tylac 2241	.5300 [1]
Tylac 2430	.5000 [1]
Tylac 2570	.5300 [1]
Tylac 2830	.4500 [1]

Butadiene-Styrene Types

CL-101 (Shell)	.2800 [3]
Copo 2000	.2775 [2]
Copo 2101	.3000 [2]
Copo 2102	.3200 [2]
Copo 2105	.3200 [3]
Copo 2108	.3000 [3]
Copo 2109	.2775 [2]
Copo 2110	.3200 [2]
Copo 3852	.3000 [2]
FR-S 110	.3000 [2]
FR-S 150	.3000 [2]
FR-S 151	.2900 [2]
FR-S 174	.2950 [2]
FR-S 176	.2775 [2]
FR-S 2000	.2775 [2]
FR-S 2001	.2775 [2]
FR-S 2002	.3000 [2]
FR-S 2003	.3050 [2]
FR-S 2004	.3050 [2]
FR-S 2006	.2900 [2]
FR-S 2105	.3200 [2]
Naugatex 2000	.2775 [1]
Naugatex 2001	.2775 [1]
Naugatex 2002	.3000 [1]
Naugatex 2006	.2900 [1]
Naugatex 2105	.3200 [1]
Naugatex 2107	.3200 [1]
Naugatex 2108	.3000 [1]
Naugatex 2113	.2900 [1]
Naugatex J-8174	.3200 [1]
Naugatex J-8535	.3000 [1]
Pliolite 2000	.2775 [2]
Pliolite 2001	.2775 [2]
Pliolite 2076	.2900 [2]
Pliolite 2104	.3200 [2]
Pliolite 2105	.3200 [2]
Pliolite 2107	.3200 [2]
Pliolite 2108	.3000 [2]
S-2000 and S-2006	.2600 [2]
S-2101	.2600 [2]
S-2105	.2800 [2]
S-2108	.2900 [2]

Neoprene

Neoprene Latex 60	.4000 [3]
Neoprene Latex 571	.3700 [3]
Neoprene Latex 572	.3900 [3]
Neoprene Latex 601-A	.4000 [3]
Neoprene Latex 673	.5000 [3]
Neoprene Latex 735	.3800 [3]
Neoprene Latex 736	.3800 [3]
Neoprene Latex 842-A	.3700 [3]
Neoprene Latex 950	.4700 [3]

Polysulfide Rubbers

Thiokol Type MX	.8000 [3]
Thiokol Type WD-2	1.2500 [3]
Thiokol Type WD-6	.8000 [3]

Notes: (1) Freight allowed. (2) Freight extra. (3) Freight prepaid. *Covers a wide range of compounds. Readers are urged to check specific prices with producers.

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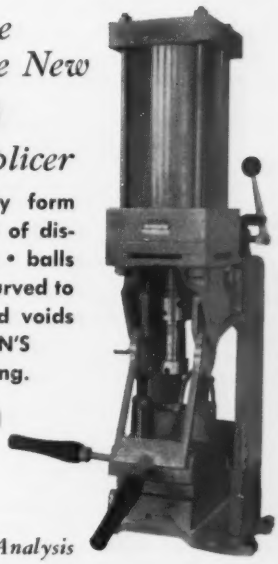

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MARKETS

(continued)

Reclaimed Rubber

Reclaimed rubber consumption for April was estimated at 24,200 long tons by the Rubber Manufacturers Association. Thus, this sector felt the same decline from the previous month's level as natural and synthetic were experiencing. The March consumption figure for reclaim had been 131,933 long tons, making the drop fairly proportionate throughout the industry.

Exports of reclaimed rubber were also down about 10 per cent, to total 26,225 tons. An interesting note was provided by the complete absence of imports. Stocks, however, were accumulating at a higher rate: 30,550 long tons at the end of the month, against only 25,131 in April of 1959. If domestic retreads boom as predicted, and exports climb again, the general outlook should be very favorable.

(Prices for All Areas Except Calif.)

	per lb.
Premium Grade Whole Tire	.11½
First Line Whole Tire	.11
Second Line Whole Tire	.10½
Third Line Whole Tire	.10¼
Fourth Line Whole Tire	.09¾
Black Carcass	.15¼
No. 1 Light Colored Carcass	.22
No. 1 Peel	.11
Butyl Tube Reclaim	.14
Natural Rubber Black Tube	.16
Natural Rubber Red Tube	.21
Natural Rubber Gray Tube	.21

Scrap Rubber

Scrap rubber consumption was fairly constant, with Rubber Manufacturers Association figures revealing 24,517 long tons used during April. This brought the four-month total to 100,-516. At this rate, 1960 consumption may yet exceed earlier conservative estimates and break the 300,000 long ton mark.

Among the remaining imponderables, however, was the extent to which predictions for an upswing in auto production, as well as in the reclaim trade, would be borne out in actuality. Lacking a trusty crystal ball, one could only look for straws in the wind. Good consumer demand and adjustments in inventory at the dealer level furnished some indications of higher production rates in autos and trucks following the summer doldrums.

(Prices Delivered Akron)

Mixed tires	ton	15.00
Light colored carcass	lb.	.05½
No. 1 peelings	ton	50.00
No. 2 peelings	ton	28.00
No. 3 peelings	ton	23.00
Buffings	ton	16.00
Truck and Bus S.A.G.	ton	22.00
Passenger S.A.G.	ton	20.00
Natural Rubber Red Tubes	lb.	.07½
Natural Rubber Black Tubes	lb.	.07
Butyl Rubber Tubes	lb.	.08½

Tire Fabrics

New statistical evidence documents the slump in rayon yarn shipments that has been evident since March. Last month's shipments of high-tenacity yarn to tire makers and producers of hose and belting fell 25 per cent below the April, 1959, level. Totaling 21.7 million pounds, they also represented an 18 per cent drop from March, 1960, shipments, according to the Textile Economics Bureau, Inc.

In view of promising January and February figures, the latest decline is being discounted by rayon manufacturers as a temporary reflection of fluctuating tire demand. One Tyrex firm blamed downward revisions in auto production schedules, as well as consumer delay in purchasing replacement tires because of the bad weather earlier this Spring.

Nylon yarn producers took umbrage at the apparent facility of the explanation. Addressing the New York Society of Security Analysts, Edward A. O'Neal, Jr., president of Chemstrand Corp., viewed the slump as another entering wedge for nylon. He commented, "I think someone is going to break through in the next two years. The price is right."

While Mr. O'Neil did not question rayon's tight hold on about 98 per cent of the current passenger-tire market, he painted a picture of sharply rising consumption amid fierce competition for the non-cellulosic fiber trade. The two latest price cuts for nylon, both matched by Tyrex makers, may not be the end of the struggle.

In his opinion, the non-cellulosics, which include nylons, acrylics and polyesters, should be marketed at a billion pound level by 1965. This would mean quite a jump from the 624 million pounds sold last year, or even the 700 million Mr. O'Neil envisions for 1960.

An industry report substantiated the recent rayon decline, as reflected in first quarter production figures showing high-tenacity types leveling at 79.7 million pounds (against 80 for the like period of 1959), while non-cellulosics in general rose to 104.5 (from 98.3 last year).

(Prices f.o.b. Shipping Point)

Rayon Tire Cord

1100	lb.	.62½
1650	lb.	.62
2200	lb.	.62½

Nylon Tire Cord

210	lb.	1.75
840	lb.	1.47

Rayon Graded Fabric

1100	lb.	.69
1650	lb.	.63½
2200	lb.	.63

Cotton Chafers

8.9 oz. (per square yard)	lb.	.71
9.25 oz. (per square yard)	lb.	.72
11.65 oz. (per square yard)	lb.	.66
14.4 oz. (per square yard)	lb.	.75

Liquid Latex

Natural: The tightness in the May rubber situation was, at least in part, traceable to reduced imports during the previous months. April figures showed 4,052 long tons arriving in the U. S., making a total of 20,330 so far this year, compared with 27,701 in the first four months of 1959. Latex was being priced 50 to 51c in car load lots at East Coast ports during the past period.

Some relief was in sight, with 6,050 long tons of natural latex on the high seas at the end of April bound for the U. S. From London, the United Baltic Corp. Ltd. reports that Malayan stocks were, however, declining during the preceding period. In March, production was down to 9,508 tons compared with 9,961 in February. End of the month stocks in Malaya totaled only 6,644 long tons, against Febuary's 8,138.

Through the beginning of May, the drum latex market was relatively quiet. Some small covering for nearby shipments had taken place, but the higher prices currently quoted caused most buyers to hold off. The bulk latex market also continued uneventful, in the United Kingdom as well as in the United States.

Synthetic: The April total for synthetic latex production reached 9,430 long tons, somewhat below the prevailing level. The price squeeze on the natural product is likely to spell a rise in demand for synthetic latices, particularly "cold" types.

Cotton

The New York Cotton Exchange, as we have known it for so many years, may be a thing of the past. During the month of May there were 21 trading days. On each of these days the price of middling uplands remained at 34.15c. Government controls and market inertia have finally worked a free commodity market into an impasse. There is nothing on the horizon at this point to indicate any activity, either up or down, in the immediately foreseeable future.

In October of this year, the Secretary of Agriculture will be required by law to reduce long staple acreage from the current allotment of 72,000 acres planted last year to about 35,000 acres for 1961. Chances for Congressional action to alter this program appear fairly slim. At the end of May the Agriculture Committee had just approved for House floor action a bill sponsored by the National Cotton Council to extend to 1961 this year's national marketing quota of 66,590 bales of extra-long staple.

There were some signs of incipient improvement in industrial grey goods. Some buyers were taking heart from the expected upswing in the auto business and the lessening backlog of mill orders, but the dominant note continued to be caution for wide and heavy cloth categories.

RUBBER TRENDS

by The Economist Intelligence Unit, Ltd.

RUBBER TRENDS is a quarterly bulletin for all those concerned with rubber, whether as a manufacturer, dealer or producer. The bulletin provides regular analysis of the main factors affecting the supply and consumption of both natural and synthetic rubber. **It does not duplicate information already available elsewhere; the emphasis throughout is on long term studies of rubber trends.**

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MARKET PRICES

CHEMICALS & COMPOUNDING INGREDIENTS

JUNE 1, 1960

Prices are, in general, f.o.b. works and cover the domestic markets only. Export prices, as a rule, are usually slightly higher, due to packing regulations, special handling, etc.

Abbreviations: bbls., barrels; c.l., carload; cyl., cylinder; dlvd., delivered; dms., drums; eqld., equalized; l.c.l., less than carload; M.B. masterbatch; min., minimum; ref., refined; sap., saponified; sp., special; syn., synthetic; t.c., tank cars.

*Trademark. †For Export Only.

The arrangement of this section closely follows the Chemical Section of the 1959 RUBBER RED BOOK. Readers are referred to that edition for the correct classification of any material or brand name. Suppliers of every material are contacted for price information. However, only those materials are listed for which quotations have been furnished within the past six months. The quotations are not guaranteed and prospective purchasers should contact suppliers for information. Suppliers are requested to send current price information to the Market Editor, RUBBER AGE.

ACCELERATORS

A-1 (Thiocarbanilide)*	lb.	.74	.81
A-32*	lb.	.60	.80
A-100*	lb.	.52	.66
Accelerator No. 8*	lb.	—	1.25
Accelerator—49*	lb.	.59	.60
Accelerator 108*	lb.	—	.92
Accelerator—552*	lb.	—	2.25
Accelerator—808*	lb.	.66	.68
Accelerator—833*	lb.	1.17	1.19
Accelerator B*	lb.	—	.92
Altax*	lb.	.54	.56
Amax*	lb.	.75	.77
No. 1*	lb.	.71	.73
Ancap*(†)	lb.	.38	.40
Ancatax*(†)	lb.	.48	.50
Ancazate BU (ET & ME)*(†)	lb.	—	1.07
Ancazide ET*(†)	lb.	—	1.07
ME*(†)	lb.	—	1.14
Arazate*	lb.	—	2.25
Arquad 12*	lb.	.55	.61
Beutene*	lb.	.66	.68
Bismate, Rodform*	lb.	—	3.00
Butazate 50D*	lb.	.87	.89
Butyl Eight*	lb.	1.10	1.35
Butyl Namate	lb.	.45	.50
Captax*	lb.	.44	.46
C-P-B*	lb.	—	1.95
Cumate, Rodform*	lb.	—	1.45
Cydac*	lb.	.71	.73
Delac S*	lb.	.71	.73
DIBS*	lb.	—	.85
Diorthotolyguanidine	lb.	.69	.70
Dipac*	lb.	—	.85
Diphenylguanidine	lb.	.49	.50
Dithiocarbamates			
Cyzate B & E	lb.	.85	.89
El-Sixty*	lb.	.62	.69
Ethazate*	lb.	—	1.04
50D*	lb.	.87	.89
Ethyl Thiurad*	lb.	—	1.04
Ethyl Tuex*	lb.	—	1.04
Ethylac*	lb.	.93	.95
Geigy Amines	lb.	.46	.52
Guantal*	lb.	.62	.69
Hepteen Base*	lb.	—	1.85
Kure-Blend MT*	lb.	—	.70
Ledate, Rodform*	lb.	—	1.04
MBT XXX*	lb.	.55	.57
MBTS Grains*	lb.	.54	.56
Merac*	lb.	.75	1.05
Mercaptobenzothiazol	lb.	.44	.46
Mercaptobenzothiazyl Disulfide	lb.	.54	.56
Mertax*	lb.	.55	.62
Methazate*	lb.	—	1.04
Monex*	lb.	—	1.14
Mono Thiurad*	lb.	—	1.14
2-MT	lb.	.88	.90
NA-22* (for neoprene)	lb.	—	1.05
NOBS No. 1*	lb.	.71	.73
Special*	lb.	.75	.77
O-X-A-F	lb.	.55	.57
Pennac SDB*	lb.	.45	.48
Pentex*	lb.	—	1.24
Flour*	lb.	—	.30
Permalux (Neoprene)*	lb.	—	2.25
Phenex*	lb.	.60	.65
Polyac*	lb.	—	1.85
R-2 Crystals*	lb.	—	4.35
Rotax*	lb.	.55	.57
RZ-50-A* and B*	lb.	.70	1.00
Santocure*	lb.	.71	.73
NS*	lb.	.71	.73
26*	lb.	.75	.77
Selenac* (Ethyl, Methyl)	lb.	—	3.00
Seleram, Ethyl	lb.	—	3.00
Setsit-5*	lb.	.75	1.05
9*	lb.	.85	1.15
SPDX-GH*	lb.	.77	.79
GL*	lb.	1.20	1.30
Tellurac*	lb.	—	1.55
Tepidone*	lb.	.45	.45
Tetrone A*	lb.	—	1.98
Thiate A*	lb.	.88	—
B*	lb.	1.05	1.25
Thiazole ZMBT	lb.	.55	.57
Thiofide*	lb.	.54	.61
Thionex*	lb.	—	1.14
Thiotax*	lb.	.44	.51
Thiram, Ethyl	lb.	—	1.04
Methyl	lb.	—	1.14
Thiurad*	lb.	—	1.14
Thiuram E*	lb.	—	1.04
M*	lb.	—	1.14
Cyuram DS & MS	lb.	1.14	1.14
Trimene*	lb.	.56	.58
Base*	lb.	1.03	1.06
Triphenyl Guanidine	lb.	—	.90
Tuads* (Ethyl)	lb.	—	1.04
Tuads* (Methyl)	lb.	—	1.14
Tuex*	lb.	—	1.14
Ultex*	lb.	1.15	1.20
Unads*	lb.	—	1.14
Vulcacure NB*	lb.	.45	.45
NS*	lb.	.75	1.05
TMD*	lb.	—	1.14
ZB*, ZE*, ZM*	lb.	.85	.89
Z-B-X*	lb.	—	2.45
Zenite*	lb.	.54	.56
Zenite A*	lb.	.69	.71
Zenite AM*	lb.	.76	.78
Zenite Special*	lb.	.55	.57
Zetax* (uncoated)	lb.	.55	.57
Zimate* (Butyl)	lb.	—	1.04
Zimate* (Ethyl)	lb.	—	1.04
Zimate* (Methyl)	lb.	—	1.04
Zimate Slurry 50% solids content (Butyl, Ethyl & Methyl)	lb.	.85	.89
Ziram, Butyl	lb.	—	1.04
50% Dispersion	lb.	.85	.89
Ziram, Ethyl	lb.	—	1.04
50% Dispersion	lb.	.85	.89
Ziram, Methyl	lb.	—	1.04
50% Dispersion	lb.	.85	.89

ACTIVATORS

Blue Lead Sublimed	lb.	.17	.18
Cottonseed Fatty Acids			
Drew Wecoline C*	lb.	.17¾	.19
Wochem 210* and 211*	lb.	.15¾	.18½
Fish Oil, Hydrogenated, Fatty Acid			
Century Hydrex 440	lb.	.11½	.14
DAR-S*	lb.	.11½	.14
DAR-HY*	lb.	.14¾	.17¾
Groco 56*	lb.	.11½	.14
Hydrofol Acids*	lb.	.11½	.21½
Hyfac 430*	lb.	.18	.20½
Neo-Fat H.F.O.*	lb.	.14½	.15¾
Neutrex*	lb.	.13¾	.16¾
Stearite*	lb.	.11¾	.14½
Talene*	lb.	.16½	.18¾
Wecoline 200*	lb.	.14¾	.16
1000*, 1500*	lb.	.12	.13¾
Wochem 730*	lb.	.11½	.14
731*	lb.	.14¾	.17½
732*	lb.	.15¾	.18¾
Lime, Hydrated			
Arrowhead*	ton	—	21.00
Marblehead*	ton	—	19.25
Sierra*	ton	—	22.50
Litharge			
Eagle-Picher* (c.l.)	lb.	.13¾	—
National Lead*	lb.	—	.13¾
SB*	lb.	—	.18½

ACTIVATORS (Cont'd)

Magnesium Oxide, Heavy			
DCI 601*	lb.	.25¼	—
General Magnesite 500*	lb.	.05½	.06
900*	lb.	.06½	.07
Kaiser 325*	lb.	.03½	.06½
Michigan No. 15*	lb.	.05½	.06½
Morton's Magnesia	lb.	.25¼	—
Magnesium Oxide, Light			
Carey Mag*	lb.	.25¼	.26
DCI Technical*	lb.	.21½	.23½
General Magnesite* (neoprene grade)	lb.	.26¾	.28¾
General Magnesite No. 101*	lb.	.24¾	.27¼
Genmeg MLW*	lb.	.25¼	.27¾
Light Calcined Magnesia No. X-01*	lb.	.25¼	.26
Maglite D*	lb.	.25¼	—
K*	lb.	.25¾	.27
L*	lb.	.29¾	.30¾
M*	lb.	.27	.28½
Seamag*	lb.	.20	.20½
Marmag*	lb.	.24¾	.26
Michigan No. 30*	lb.	.24¼	.26½
Michigan 1782 Magnesia*	lb.	.25¾	.26½
Neomag Powder*	lb.	.29¼	.30
Pellets*	lb.	.31¼	.32
Oleic Acid			
Dar-Chem* 105	lb.	.16¼	.18¾
Drew Wecoline OO*	lb.	.17¾	.19
Emersol 210*	lb.	.16¼	.18¾
Groco Red Oil	lb.	.16¼	.18¾
Neo-Fat 92-04*	lb.	.20½	.22½
94-04*	lb.	.18½	.20½
Wochem 310, 311	lb.	.16¼	.18¾
Palm Fatty Acids			
Groco 45*	lb.	.15¾	.18¼
Neo-Fat*	lb.	.15¾	.17¾
Wochem 280*	lb.	.15¾	.18¼
281*	lb.	.16¼	.18¾
Potassium Oleate (dms.)	lb.	.48	.73
Drew 24%*	lb.	.20	.73
Red Lead			
Eagle-Picher* (c.l.)	lb.	.14¼	—
National Lead*	lb.	.14¼	.14¾
No. 2 RM*	lb.	—	.18½
Sodium Laurate, 75%	lb.	.64	.89
Sodium Oleate, 75%	lb.	.54	.79
Paste (dms.)	lb.	.39	.64
Sodium Stearate, 75%	lb.	.47	.72
Stearic Acid, Single Pressed			
Century 1210*	lb.	.15¼	.17¾
Emersol 110*	lb.	.15¼	.17¾
Neo-Fat 18-53*	lb.	.14¾	.16¾
Dar-Chem 11*	lb.	.15¼	.17¾
Stearic Acid, Double Pressed			
Century 1220*	lb.	.15¾	.18¼
Dar-Chem 12*	lb.	.15¾	.18¼
Emersol 120*	lb.	.15¾	.18¼
Groco 54*	lb.	.15¾	.18¼
Neo-Fat 18-54*	lb.	.15¼	.17¾
Stearic Acid, Other			
Century 1230*	lb.	.17½	.20
1240-Supra*	lb.	.17½	.20
Extra Pearlstearic*	lb.	.17½	.20
Neo-Fat 18*	lb.	.18½	.20½
18-58*	lb.	.14¼	.16¼
18-61*	lb.	.16¼	.18¼
Stearex*	lb.	.11¾	.13
Stearite*	lb.	.11¾	.13¼
Wecoline 300*	lb.	.15¼	.16½
Wochem 720*	lb.	.10¾	.13¼
721*	lb.	.10¾	.13¼
White Lead Basic Carbonate	lb.	.18	.19
White Lead Basic Sulfate	lb.	.17	.18
Zinc Laurate			
Laurex*	lb.	.37	.39
Zinc Stearate	lb.	.41	.46
Aquazinc K.C.*	lb.	.30	.55
Crown Brand*	lb.	.39	.44

Unclassified Activators

Aktone*	lb.	.21¼	.23¼
Barak*	lb.	—	.65
Curade*	lb.	.57	.59
DCI Magnesium Carbonate*	lb.	.11	—
Dibenzo G-M-F	lb.	—	2.60
D-B-A*	lb.	—	1.95
G-M-F*	lb.	—	2.60
Dibutylamine (dlvd.)	lb.	.55½	.56½
MODX*	lb.	.38	.40
Neo Fat 42-07*	lb.	.10¼	.12¼
Ridacto* (dms.)	lb.	.25	.26
Snodotte* (dlvd.)	lb.	.18½	.21
Vimbra	lb.	.32	.38½
Vulklor*	lb.	.88	.98

ANTI-COAGULANTS

Aqua Ammonia* (dms.)	lb.	.031	.035
M.B.M.C.* (l.c.l.)	lb.	.54	.76

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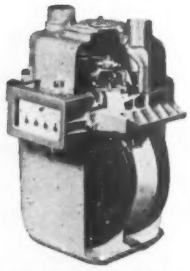

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ANTI-FOAMING AGENTS

Aero Anti Foam H*	lb.	——	**.20**
Regular*	lb.	——	**.12**
Anhydrol 6991*	lb.	.51	**.56**
D.C. Antifoam A*	lb.	4.85	5.95
Antifoam A Emulsion*	lb.	1.78	2.58
Antifoam AF Emulsion*	lb.	1.78	2.58
Antifoam B*	lb.	.59	1.06
Defoama W-1701*	lb.	——	**.12½**
Defoamer A-25*	lb.	——	**3.00**
Defoamer 630*	lb.	——	.14
Deltyl Prime	lb.	**.70**	**.80**
Foamnix*	lb.	.60	1.50
G-E Antifoam SS-24*; 66*	lb.	**5.28**	**6.65**
60 Emulsion*	lb.	**2.05**	**3.75**
Igepol CO-210	lb.	——	.36
Kessco X-3* (dms.)	lb.	——	.39
X-180*	lb.	——	.28
X-181*	lb.	——	.36½
Nopco 1407*	lb.	.20½	.22½
1497-V*	lb.	.15¼	.17¼
1907-B*	lb.	.22½	.25
JMK*	lb.	.48½	.51
JMU*	lb.	.23¼	.25¾
JMY*	lb.	.23¼	.23½
NDW*	lb.	.21½	.24
Pluronic L61*	lb.	**.33½**	**.39**
RS-968*	lb.	**.38**	**.38½**
Terpinol Prime No. 1	lb.	**.35**	**.50**
Tributyl Phosphate (dms.)	lb.	**.52½**	**.53½**
UC SAG 47*	lb.	4.85	6.25
470*	lb.	.61	1.10
VL-520*	lb.	2.68	3.50

ANTIOXIDANTS

Agebest 1293-22A*	lb.	1.90	**2.00**
AgeRite Alba*	lb.	2.40	2.50
Gel*	lb.	.70	.72
Hipar*	lb.	1.05	1.07
H.P.*	lb.	.79	.81
Powder*	lb.	.57	.59
Resin*	lb.	.88	.90
Resin D*	lb.	.57	.59
Spar*	lb.	.57	.59
Stalite & Stalite S*	lb.	**.57**	**.59**
Superflex*	lb.	.57	.59
Superlite*	lb.	.57	.59
White*	lb.	1.50	1.60
Akroflex C* Pellets	lb.	.85	.87
CD*	lb.	.79	.81
Aminox*	lb.	.57	.59
Antioxidant 425*	lb.	**2.47**	**2.50**
Antioxidant 2246*	lb.	**1.50**	**1.53**
Antox*	lb.	.59	.61
Aranox*	lb.	——	3.25
Benzoquinone	lb.	**1.50**	**1.75**
Betanox Special*	lb.	.94	.96
B-L-E*	lb.	.57	.59
Catalin CAO No. 1*	lb.	.57	.60
CAO No. 3*	lb.	.65	.68
CAO No. 5*	lb.	1.49	1.50
CAO No. 6*	lb.	——	3.50
Dalpac 4	lb.	.57	.60
Deenax*	lb.	.57	.60
Diphenylamine	lb.	.31	.33
Di-tert-Butyl-para-Cresol*	lb.	.86	1.16
DBPC*	lb.	.54	.60
Eugenol C-95%*	lb.	**2.30**	**2.50**
Flectol H*	lb.	**.57**	**.64**
Flexamine*	lb.	.79	.81
Ionol*	lb.	.57	.60
Naugawhite*	lb.	.57	.59
Powder*	lb.	.57	.59
Neozone A*	lb.	.64	.66
C*	lb.	.86	.88
D*	lb.	.57	.59
Nevastain A*	lb.	.51	.61
B*	lb.	.51	.70
Nullapon BF-12*	lb.	——	**.21½**
BF-13*	lb.	——	.25¼
BF-78*	lb.	——	.55
BF-Acid*	lb.	——	.85
Octamine*	lb.	.57	.59
Oxidex*	lb.	——	**3.60**
PDA-10*	lb.	**.46**	**.48**
Pennox* A, B, C, D	lb.	**.57**	**.72**
Permalux*	lb.	——	**2.25**
Polygard*	lb.	.57	.59
Santoflex AW*	lb.	**.71**	**.78**
DD*	lb.	.57	.64
75*	lb.	1.01	1.08
Santovar-A*	lb.	1.55	1.62
Santowhite Crystals*	lb.	1.55	1.62
Santowhite L*	lb.	.57	.64
MK*	lb.	1.25	**1.32**
Powder*	lb.	1.55	1.62
Sequestrene AA*	lb.	.70	.80
NA2*	lb.	.59	.66
NA3T*	lb.	.54	.61
Sodium Nitrate	cwt.	8.75	11.00
Stabilite*	lb.	**.57**	**.59**
Alba*	lb.	.75	.80
FLX*	lb.	.78	.80
L*	lb.	.65	.67
White*	lb.	**.57**	**.59**
White Powder*	lb.	**.46**	**.48**
Stabilizer No. 1*	lb.	**1.55**	**1.80**
Stabilizer No. 9-A*	lb.	**.80**	**1.05**
Styphen I*	lb.	**.51**	**.55**
Sunolite*	lb.	**.16**	**.22**
Tecquinol*	lb.	**.82½**	**.84½**
Tannic Acid, Tech.	lb.	**.46**	**.48**
Tenamene 3*	lb.	.57	.60
Thermoflex A*	lb.	**1.05**	**1.07**
Wing-Stay S*; T*	lb.	**.56**	**.67**
Zalba*	lb.	——	1.10
Special*	lb.	——	.85

ANTIOZONANTS

Eastozone* 32*	lb.	1.15	1.18
Flexzone 3C	lb.	——	2.00
6-H	lb.	1.25	1.27
Fura-Tone NC-1008*	lb.	**.28**	**.39**
NC-1012*	lb.	**.46**	**.69**
Santoflex AW*	lb.	.71	.78
UOP 88* & 288* (dms).	lb.	**1.05**	**1.07**
Wing-Stay 100*	lb.	1.00	1.08

ANTI-SCORCHING AGENTS

Akron Benzoic Acid	lb.	.41	.43
Armeen HT*	lb.	.34	.40
Good-rite Vultrol*	lb.	.67	.70
Harcopol 1183*	lb.	**.70**	**.74**
Retarder PD*	lb.	.37	.39
W*	lb.	——	.46
Sodium Acetate 60-62% Crystals	lb.	.08	.08½

ANTISEPTICS AND GERMICIDES

A.P.C. 6901*	lb.	.32	.38
Arquad S*	lb.	.38	.44
Formaldehyde (dms.)	lb.	.06	.076
G-4* (bbls.)	lb.	1.09	1.29
G-11*	lb.	1.98	2.08
Halane*	lb.	.40	.47
Irgason BS200*	lb.	2.50	2.75
Ortho Cresol (26°—27°)	lb.	.15	.16
Preventol GD	lb.	——	1.09
Retarder D*	lb.	**.42**	**.50**

ANTI-WEBBING AGENTS (for Latex)

DC 7 Compound*	lb.	4.70	5.80
Webnix 34-L*	lb.	1.25	1.75
57*; 69C*	lb.	1.50	2.00
71*	lb.	1.25	1.75

AROMATICS (DEODORANTS)

Airkem 115*	gal.	——	**6.50**
122*; 186*	gal.	——	6.50
Alamask AA*	lb.	——	**3.00**
AF*	lb.	——	**2.50**
AO*	lb.	——	**1.50**
AR*	lb.	——	.50
BG*	lb.	——	**1.15**
BGM*	lb.	——	.60
CY*	lb.	——	**2.40**
DJ*	lb.	——	**3.35**
DL*	lb.	——	**1.95**
H*	lb.	——	**5.50**
LD*	lb.	——	.75
ND*	lb.	——	**2.75**
O*	lb.	——	**6.50**
OS*	lb.	——	**5.25**
Bouquet 149*	lb.	——	**3.00**
Coumarin*	lb.	——	**3.70**
Deodorant 65*	lb.	——	**1.85**
Deodorant L-37*	lb.	**2.15**	**2.25**
L-44*	lb.	**2.65**	**2.75**
N.L.T.X.*	lb.	**1.90**	**2.00**
Deodorant Oil GD 6422*	lb.	**1.90**	**2.20**
GD 6423*	lb.	**1.60**	**1.90**
GD 6575*	lb.	**2.40**	**2.90**
GD 31063*	lb.	**2.25**	**2.75**
Ethavan*	lb.	**6.20**	**6.25**
Latex Perfume 17326	lb.	——	**4.00**
18301	lb.	——	**3.00**
22258	lb.	——	**2.50**
Naugaromes* (dms.)	lb.	**.60**	**3.00**
Neutroleum Delta*	lb.	——	**2.25**
Gamma*	lb.	——	**3.25**
Parador A*	lb.	**1.80**	**2.10**
C*	lb.	**2.00**	**2.50**
E*	lb.	.25	.40
GD 5280*	lb.	**2.00**	**2.50**
GD 53481*	lb.	**1.70**	**2.00**
Perfume Oil Bouquet Vanilla M*	lb.	**1.60**	**1.70**
Rodo No. 0*	lb.	**4.00**	**4.50**
No. 10*	lb.	**5.00**	**5.50**
Rubbarome* (dms.)	lb.	**.60**	**3.80**
Rubber Perfume 12*	lb.	——	**4.35**
Russian Leather 7*	lb.	——	**4.35**
Vanillin	lb.	**2.75**	**2.80**

BLOWING AGENTS

Ammonium Bicarbonate	cwt.	——	9.00
Better Blend Soda* (c.l., bags)	cwt.	——	2.70
B-I-K	lb.	.20	.22
Blowing Agent No. 81105	lb.	.32	.35
Celogen*	lb.	——	**1.95**
AZ*	lb.	1.92	1.94
80	lb.	——	1.60
Diazo Amino Benzene	lb.	——	.73
Kempore R-125	lb.	——	**1.92**
Neo Fat 42-12*	lb.	.10¼	.12¼
Opex 40	lb.	——	.72
Sodium Bicarbonate, U.S.P. (c.l., bags)	cwt.	——	2.55
Unicel ND*	lb.	——	.72
S*	lb.	——	.20
Urea	lb.	**.06**	**.07**

BONDING AGENTS

Base 6986*	lb.	.27	.32
Braze*	gal.	**6.00**	**9.00**
Braze Cover Cement*	gal.	2.50	4.00
Chemlock 201, 203	gal.	5.00	7.50
220	gal.	8.95	12.00
401	gal.	5.00	24.00
607	gal.	18.00	24.00
614	lb.	4.35	4.75

BONDING AGENTS (Cont'd)

Durez 12987*	lb.	.47½	.49
EX-B501-4	gal.	6.20	4.90
EX-B150-1	gal.	8.15	11.00
EX-B579-1	gal.	19.40	26.40
Gen-Tac Latex*	lb.	**.70**	**.75**
Hylene M*	lb.	1.25	1.50
M-50*	lb.	.86	1.11
Penacolite B1A*	lb.	——	**.95**
R-2710*	lb.	——	**.95**
Pliobond 20*	gal.	**2.91**	**4.23**
30*	gal.	**3.65**	**4.97**
Rex Compounds*	gal.	**1.30**	**1.90**
Thixons*	gal.	2.95	9.80
Ty-Ply Q (BN & S)*	gal.	**6.75**	**8.00**
Tygobond 30*	gal.	**4.10**	**5.40**
40*	gal.	5.80	6.89
41*	gal.	8.65	9.85
45*	gal.	5.75	6.48
Vinculux	gal.	——	**4.95**

COAGULANTS

Acetic Acid—56% (bbls.)	cwt	9.00	**11.00**
Glacial 99½% (dms.)	lb.	.12	**.13**
Calcium Nitrate, Tech. Flake	lb.	.07½	**.09½**
Hydroxyacetic Acid—70% (dms.)	lb.	——	**.09½**
Zinc Nitrate, Tech. Flake	lb.	——	**.20**

COLORING AGENTS

Black

Aquablak B*	lb.	.09¾	**.10⅜**
M*	lb.	.10½	.11
S*	lb.	.11¾	.12¼
Black Shield 4*	lb.	.10	.10½
No. 6	lb.	.11	.11½
No. 17	lb.	.12½	.13
No. 19	lb.	.12	.12½
Carbon Black—See *Reinforcing Agents*			
Lampblack No. 10*	lb.	**.06**	**.09**
Mapico Black Iron Oxide* (50 lb. bags)	lb.	**.14¾**	**.15**
Pure Black Iron Oxide	lb.	.14¾	.15

Blue

Akron Masterbatches*	lb.	**2.23**	**2.78**
Toners*	lb.	**2.30**	**6.35**
Blue Powders	lb.	**2.20**	**3.75**
Cooke M.B. Blue* 426	lb.	2.20	3.75
Cyan Blue GT 55-3295	lb.	——	3.20
XR 55-3760	lb.	——	2.90
XR 55-3770	lb.	——	3.25
Disco Blues	lb.	**2.20**	**3.45**
Harmon Blue Toner B-4776	lb.	——	**2.90**
Monastral Rubber Blue CPL*	lb.	**1.95**	**1.95**
PCD, Dispersed*	lb.	——	**2.55**
Peacoline Blue*	lb.	——	**3.85**
Ramapo Blue*	lb.	**2.75**	**3.00**
Rubber Blue GD* (Disp.)	lb.	——	**4.75**
Rubber Blue X-1999*	lb.	——	**1.90**
Rubber Dispersed Blues	lb.	**2.52**	**2.78**
Solfast Blue*	lb.	1.60	3.25
Stan-Tone MBS*	lb.	2.20	2.92
GPE*	lb.	2.25	2.75
PEC*	lb.	1.95	2.10
Ultramarine	lb.	**.14**	**.30**
Vansul Blue M.B.*	lb.	1.00	2.70

Brown

Brown Iron Oxide	lb.	.15¾	.16
Mapico Brown* (50 lb. bags)	lb.	**.15¾**	**.16**
Stan-Tone GPE*	lb.	——	**3.00**
Vansul Brown M.B.* (Organic)	lb.	——	**2.30**

Green

Akron Masterbatches*	lb.	1.53	3.08
Toners*	lb.	1.50	4.35
Chromium Oxide	lb.	.44½	.45¼
Cooke M.B. Green*	lb.	**1.60**	**2.80**
413*	lb.	——	2.80
Cyan Green 15-3100	lb.	——	3.35
Disco Greens	lb.	1.55	**2.80**
Green Powders	lb.	**1.35**	**3.95**
Harmon Green Toner G-5056	lb.	——	3.95
Hi-Fiz Fluorescent	lb.	1.60	2.60
Monastral Rubber Green GSD* (Dispersed)	lb.	——	**2.80**
GSL*	lb.	**2.20**	**2.20**
Permansa Green CP-1236*	lb.	——	1.45
Pigment Green B*	lb.	1.45	1.50
GL-652D*	lb.	.90	.95
Ramapo Green*	lb.	——	**3.50**
Rubber Dispersed Greens	lb.	**1.23**	**3.08**
Rubber Green FD* (Disp.)	lb.	——	**2.05**
Rubber Green X-1292*	lb.	——	**1.75**
Serene Green*	lb.	——	3.50
Solfast Green*	lb.	1.60	3.35
Stan-Tone MBS*	lb.	2.50	3.42
GPE*	lb.	1.50	1.70
PC*	lb.	**2.20**	**2.25**
Vansul Green M.B.*	lb.	1.50	2.75

Maroon

Akron Masterbatches*	lb.	3.53	4.38
Toners*	lb.	.98	5.60
Harmon Maroon Toner MV-6606	lb.	——	5.75
Pyrolux Maroon*	lb.	——	**3.40**
Vansul Maroon M.B.*	lb.	——	4.05

COLORING AGENTS (Cont'd)

Orange

Akron Masterbatches*	lb.	2.53	2.98
Toners*	lb.	2.97	4.30
Benzidene Orange	lb.	—	3.30
Cooke MB*	lb.	2.25	2.35
425*	lb.	—	2.25
Dianisidine Orange*	lb.	—	2.85
Disco Oranges	lb.	2.30	2.85
Harmon Diane Orange Toner Y-25	lb.	—	2.85
Pyrazolone Orange Toner YB-3	lb.	—	3.30
Hi-Fiz Fluorescent	lb.	1.40	2.40
Mercadium X-2667*	lb.	—	1.65
Molybdate Orange	lb.	—	.49
Oswego Orange X-2065*	lb.	—	3.30
Rubber Orange OD* (Disp.)	lb.	—	2.25
Stan-Tone Cadmium Dry*	lb.	1.85	4.28
Cadmium Paste*	lb.	2.43	2.85
GPE*	lb.	1.05	1.20
PC*	lb.	.75	.80
Vansul Orange M.B.*	lb.	2.30	2.65

Red

Akron Masterbatches*	lb.	1.30	3.68
Toners*	lb.	.98	5.60
Arcturus Reds*	lb.	—	1.35
Antimony Trisulfide	lb.	.72	.78
R.M.P. Sulfur Free*	lb.	—	.78
R.M.P. No. 3*	lb.	—	.72
Bonadur 20-6440	lb.	—	1.90
20-6540	lb.	—	2.00
Brilliant Toning Reds*	lb.	1.77	1.90
Cadmolith Red* (dms.)	lb.	1.94	2.87
Clarion 20-7150	lb.	—	1.35
Cooke M.B. Red*	lb.	1.05	3.25
410*	lb.	—	1.75
Disco Reds	lb.	1.05	3.25
Graphic Red* (dlvd.)	lb.	.98	1.03
Harmon Electra Red Toner	lb.	—	3.45
Lithol Rubine Toner R-6142	lb.	—	1.60
Pyrazolone Red Toner	lb.	—	1.40
Rincon Red Tones	lb.	—	1.90
Hi-Fiz Fluorescent	lb.	1.15	2.15
Kroma Reds*	lb.	.14¼	.14½
Lake Red C*	lb.	—	1.25
Mapico Reds* (50 lb. bags)	lb.	.14¼	.14½
Mercadium X-2668 Light*	lb.	—	1.72
X-2669 Medium Light*	lb.	—	1.80
X-2670 Medium*	lb.	—	1.87
X-2671 Dark*	lb.	—	1.95
Naphthol 20-7575	lb.	—	3.80
Oximony Red Iron Oxide	lb.	.14¼	.14½
Plasticone Red*	lb.	1.02	4.60
Polaris Red*	lb.	—	1.70
Recco Red Oxide*	lb.	.13½	.13¾
Red Iron Oxide, Light	lb.	.14¼	.14½
Red Powders	lb.	—	4.40
Rubber Dispersed Reds	lb.	1.47	3.58
Rubber Red PBD* (Disp.)	lb.	—	2.05
2BD, Dispersed*	lb.	—	2.00
2BL*	lb.	1.24	1.24
PBL*	lb.	1.24	1.24
Rubanox Reds*	lb.	1.47	1.60
Rubber Red CP-339* (dlvd.)	lb.	—	1.10
Rubber Red X-1148*	lb.	—	.98
Solfast Red*	lb.	1.47	1.80
Stan-Tone MBS*	lb.	1.00	3.75
GPE*	lb.	.70	3.05
PC*	lb.	1.10	1.45
Vansul Red M.B.*	lb.	1.00	3.35
Watchung Red*	lb.	1.90	1.90

Tan

Mapico Tan 15* (50 lb. bags)	lb.	.23¼	.23½
20* (50 lb. bags)	lb.	.23¼	.23½

White—Lithopone

Permolith*	lb.	.0825	.09125
Sunolith*	lb.	.0800	.0875

White—Titanium Pigments

Iceberg*	lb.	—	.0265
Icecap K*	lb.	—	.03¼
Horse Head Anatase Grades*	lb.	.25½	.26½
Rutile Grades*	lb.	.27½	.28½
Stan-Tone PC*	lb.	.55	.60
Ti-Cal*	lb.	.09	.09¾
R-22*, R-25*, R-27*, R-30*	lb.	.09¾	.09⅞
R-60*	lb.	.09⅝	.10⅛
Ti-Pure*	lb.	.24½	.27½
Anatase Grades*	lb.	.25½	.26½
R-100*, R-500*	lb.	.27⅛	.28½
Titanox A*—all grades (dlvd.)	lb.	.25½	.26½
C-50* (dlvd.)	lb.	.14⅜	.14⅞
RA* (dlvd.)	lb.	.27½	.28½
RA-10* (dlvd.)	lb.	.27½	.28½
RA-NC* (dlvd.)	lb.	.27½	.28½
RC* (dlvd.)	lb.	.09⅝	.10⅛
RC-HT* (dlvd.)	lb.	.09⅜	.09⅞

COLORING AGENTS (Cont'd)

White—Titanium Pigments (Cont'd)

Unitane O-110*	lb.	.25½	.26½
O-220*	lb.	.25½	.26½
O-310*	lb.	.25½	.26½
OR-150*	lb.	.27½	.28½
OR-250*	lb.	.27½	.28½
OR-340*	lb.	.27½	.28½
OR-342*	lb.	.27½	.28½
OR-350*	lb.	.27½	.28½
OR-540*	lb.	.27½	.28½
OR-640*	lb.	.27½	.28½
Zopaque*	lb.	.24½	.25½
R*	lb.	.26½	.27½

White—Zinc Oxide (American Process)

AZODOX 44, 45	lb.	.1450	.1550
AZO-ZZZ 11*, 22*, 33*, 44* 55*	lb.	.1450	.1550
Eagle-Picher AAA*	lb.	.1450	.1550
Horse Head Special*	lb.	.1450	.1550
XX*	lb.	.1450	.1550
Protox 166*	lb.	.1450	.1550
167*	lb.	.1450	.1550
267* (pelleted)	lb.	.1450	.1550
St. Joe Black Label* 20, 20-21	lb.	.1450	.1550
Red Label* 30, 31	lb.	.1450	.1550
Green Label* 12, 46 (latex only)	lb.	.1450	.1550
Green Label* 42, 42-21, 42A-3, 43 Pelets	lb.	.1450	.1550

White—Zinc Oxide (Dispersed)

Dispersed Zinc Oxide	lb.	—	.13

White—Zinc Oxide (French Process)

AZO-ZZZ 66	lb.	.1450	.1550
Florence Green Seal*	lb.	.1625	.1725
Red Seal*	lb.	.1575	.1675
White Seal*	lb.	.1675	.1775
Kadox 25*	lb.	.1500	.1600
15*, 17*, 72* & 515	lb.	.1450	.1550
Protox 168*	lb.	.1450	.1550
169*	lb.	.1450	.1550
268* (pelleted)	lb.	.1450	.1550
U.S.P. (cartons)	lb.	.1775	.1875
XX-78*	lb.	.1450	.1550

White—Zinc Sulfide

Cryptone ZS*	lb.	.2530	.2630
Lehigh 12%*	lb.	.1250	.1350
18%*	lb.	.1400	.1500
35%*	lb.	.15375	.16375
50%*	lb.	.1575	.1675

Yellow

Akron Masterbatch*	lb.	1.27	2.48
Toners*	lb.	2.20	6.00
Benzidene-Lightfast	lb.	3.40	5.35
Benzidine Yellow	lb.	1.41	2.55
Cadmolith Yellow (dms.)	lb.	—	1.19
Chrome Yellow	lb.	.35	.35
Cooke M.B. Yellow 405*	lb.	2.15	2.75
Disco Yellows	lb.	2.05	3.95
Harmon Benzidene Yellow Toner YB-2	lb.	—	2.25
Fanchon Yellow Toner	lb.	—	2.20
Hi-Fiz Fluorescent	lb.	1.60	2.60
Iron Oxide, Pure Light Shades	lb.	.12½	.12¾
Dark Shades	lb.	.12	.12¼
Mapico Yellow* (50 lb. bags)	lb.	.12	.12¼
Rubber Dispersed Yellows	lb.	1.27	2.13
Rubber Yellow GD* (disp.)	lb.	—	2.25
GL*	lb.	—	1.68
Rubber Yelow X-1940*	lb.	—	2.25
Stan-Tone Cadmium Dry*	lb.	2.80	3.03
Cadmium Paste	lb.	1.72	1.82
MBS*	lb.	1.30	2.20
GPE*	lb.	.70	3.25
PC*	lb.	.55	3.50
Toluidine Yellow	lb.	2.20	2.20
YL-660 D*	lb.	1.25	1.35
Oximony Iron Oxide	lb.	.14¼	.14½
Vansul Yellow M.B.*	lb.	1.15	2.15
Yellow Powders	lb.	2.00	5.00
Zinc Yellow	lb.	.29	.29

DISPERSING AGENTS

Anchoid*(†)	lb.	.24	.25
Anhydrapent*	lb.	.56	.59
Armeen 18*	lb.	.39	.45
Belloid TD*	lb.	.15¾	.16¼
Blancol*	lb.	—	.15¾
Darvan No. 1*, No. 2*, No. 3*	lb.	.22	.35
No. 6*	lb.	.15¼	.15¾
No. 7*	lb.	.18¾	.23¾
Daxad 11* (21*, 23*)	lb.	.08	.30
Diethanolamine (dms., dlvd.)	lb.	.24½	.27
Dispersaid*	lb.	1.25	1.35
Emcol K-8300* (dms.)	lb.	.14	.18
P10-59	lb.	.32	—
5120	lb.	.31	—
5138	lb.	.31	—
Emulphor ON-870*	lb.	—	.55
Furala*	lb.	.06½	.07½
Halloid*	lb.	.04½	.05½
Igepal CO-630*	lb.	—	.29
Igepon T-73*	lb.	—	.29½
Kyro EO* (dms.)	lb.	—	.29¾
Leonil SA*	lb.	—	.55

DISPERSING AGENTS (Cont'd)

Lipal No. 9-N*	lb.	.28	.29
11-O*	lb.	.28	.29
Lomar PW*	lb.	.15¼	.15¾
Marasperse C*	lb.	.06¼	.06¾
CB*	lb.	.15	.17
N*	lb.	.09½	.10½
Monoethanolamine (dms., dlvd.)	lb.	.25	.27½
Naccosol A (dlvd.)	lb.	—	.52
Naccotan A*	lb.	.16½	.17
Nekal BA-75*	lb.	—	.40
BX-78*	lb.	—	.64
Nopcosant*	lb.	.15¼	.15¾
Pluronic F68*	lb.	.38½	.44
Polyfon*	lb.	.08	.10
R & R 551*	lb.	—	.28
Stablex B*	lb.	.50	.95
Stan-Chem BQC*	lb.	.12¼	.17¾
1067*	lb.	—	.13½
1471*	lb.	.1687	.2187
2251*	lb.	.12¼	.17¼
Trenamine D-25*	lb.	.32½	.36
Triethanolamine (dms., dlvd.)	lb.	.22	.25½
Yelkin TT* (and TTS*)	lb.	.13	.16

EXTENDERS

Arcco 1294-36B*	lb.	.11½	.12½
Car-Bel-Ex-A*	lb.	—	.144
Extender 600*	lb.	—	.1870
Facile Gum 4A*	lb.	.48	.50
Millex*	lb.	—	.07
W*	lb.	—	.07
Nopco 2271*	lb.	.16¾	.18¾
OPD*	lb.	.29	.40
Polyco 418*	lb.	.17	.18
PR-162 Latex Extender*	lb.	—	.182
Solvitose HDF*	lb.	.22	.25
Synpruiac*	lb.	.16	.23
Synprowax*	lb.	—	.23
Vanadiset B*	lb.	.0360	.07
C*	lb.	.0310	.06
MR* 80 mesh	lb.	.08½	.12½
Vistanex MM Grades*	lb.	—	.35
Wilcarbo Carbon Powders*	lb.	.08	.15

FILLERS (Inert and Reinforcing)

Abrasives Carbonite*	lb.	.21½	1.35
Lionite*	lb.	.16	1.27
Pumice	lb.	.03	.05
Walnut Shell Grits	ton	60.00	-110.00
Aluminum Hydrate	lb.	.031	.170
Kaiser Aluminum Hydrate*	lb.	.035	.065
Aluminum Silicate AFD*	ton	29.50	36.00
Aluminum Flake*	ton	29.50	36.00
Marter White*	tot	18.50	30.00
Barium Carbonate (l.c.l.)	ton	109.00	-126.50
Barytes No. 1 Floated, White*	ton	55.00	79.85
No. 2 Floated, Unbleached*	ton	50.00	74.85
No. 22 Barytes* (c.l.)	ton	—	30.00
No. 3805 Barytes*	ton	22.00	26.75
Foam A*	ton	—	55.00
Sparmite*	ton	80.00	90.00
X10R*	ton	90.00	95.00
Bentonite (c.l.)	ton	—	13.50
Argosite Clay* (c.l.)	ton	—	12.50
Bennett Clay* (c.l.)	ton	—	32.50
SPV Volclay* (c.l.)	ton	—	13.50
White Hi-Gel*	ton	—	65.90
Blanc Fixe	ton	125.00	-142.00
Calcium Carbonate Allied Whiting	ton	—	11.50
Atomite* (c.l.)	ton	32.50	35.00
B.I. White No. 1 (c.l.	ton	—	10.00
Calcene NC*	ton	80.00	-100.00
TM*	ton	82.50	-102.50
Calwhite*	ton	20.00	25.00
T*	ton	25.00	30.00
Camel-Carb*	ton	—	14.00
Camel-Tex*	ton	—	22.00
Camel-Wite*	ton	—	35.00
Carbium	ton	30.00	40.00
CCO White*	ton	—	22.00
Duramite*	ton	20.00	22.00
Gamaco* (c.l.)	ton	32.50	37.50
T*	ton	37.50	42.50
GamaKal*	ton	37.50	42.50
Georgia Marble 5-25* (c.l.)	ton	—	20.00
No. 10 White* (c.l.)	ton	—	11.00
Kalite*	ton	52.50	67.50
Kalmac*	ton	23.00	28.00
Laminar*	ton	—	30.00
Lesmite* (c.l.)	ton	—	27.50
Lorite*	ton	30.00	36.00
Millical*	ton	38.00	53.00
Multifex MM*	ton	117.50	-137.50
Non-Fer-Al*	ton	35.00	50.00
Purecal M*	ton	56.75	80.75
SC* (and T*)	ton	110.00	-125.00
U*	ton	120.00	-135.00
PPTD* (c.l.)	ton	—	30.00
Rambo No. 1*	ton	—	11.50
Snowflake*	ton	20.00	22.00
Super Multifex*	ton	167.50	-187.50
Surfex*	ton	42.00	57.00
Suspenso*	ton	38.00	43.00
Witcarb Reg.*	ton	60.00	85.00
R*	ton	127.50	-150.00
RC*	ton	117.50	-140.00
York White*	ton	—	11.50

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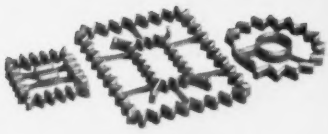

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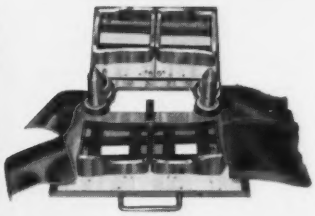

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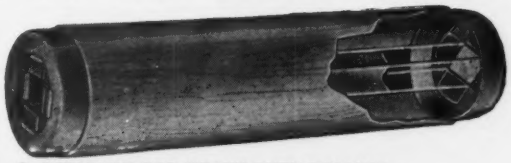

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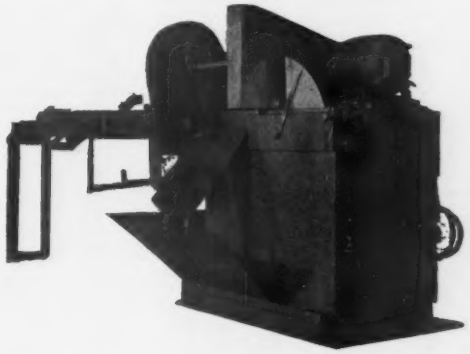

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Silene EF*	lb.	.06	.06½
Calcium Sulfate, Anhydrous			
Snow White Filler*	ton	—	22.00
Calcium Sulfate Hydrous			
Terra Alba No. 1*	ton	—	17.00
Chalk Whiting (l.c.l.)	lb.	.01½	.01¾
Recco Paris Whiting*	ton	—	35.00
OMYA Whiting*	ton	—	35.00
Clay			
Afton Clay*	ton	13.00	38.00
Aiken Clay*	ton	14.50	—
Akron HC-100*	ton	14.50	—
HC-75*	ton	13.00	—
SC-25*	ton	14.50	—
Alsilite* (c.l.)	ton	30.00	45.00
Aluminum Flake*	ton	25.50	28.50
Barden R*	lb.	8.50	13.00
Buca* (c.l.)	ton	—	45.00
Burgess No. 20*	ton	—	33.00
No. 30*	ton	—	40.00
Burgess Iceberg*	ton	—	53.00
Icecap K*	ton	—	65.00
Catalpo* (c.l.)	ton	33.00	—
Champion*	ton	—	14.50
Crown*	ton	—	14.50
Dixie* (c.l.)	ton	—	14.50
Dover*	ton	—	13.00
Franklin Clay—R* (c.l.)	ton	16.00	41.50
G. K. Soft*	ton	11.50	32.00
Glomax HE (bags)	lb.	65.00	—
LL (bags)	lb.	53.00	—
PVR (bags)	lb.	40.00	—
WZ (bags)	lb.	45.00	—
Harwick Clays*	ton	21.50	77.00
Hydrite RS (bags)	lb.	30.00	—
PXS (bags)	lb.	45.00	—
UF (bags)	lb.	100.00	—
10S (bags)	lb.	50.00	—
Flat "D" (bags)	lb.	25.00	—
Hi-White R*	lb.	10.00	14.50
Kaolloid Clay* (c.l.)	ton	—	10.50
LGB*	lb.	13.00	17.50
LGP*	lb.	15.50	20.00
McNamee* (c.l.)	ton	—	14.50
Natka 1200	ton	13.00	36.00
Par* (c.l.)	ton	—	12.00
Paragon*	lb.	10.00	14.50
Pigment 5*	ton	27.50	34.50
33*	ton	—	40.00
Polyfil 40	ton	40.00	—
0	ton	53.00	—
80	ton	65.00	—
C	lb.	25.00	—
F	lb.	45.00	—
X	lb.	30.00	—
Recco* (c.l.)	ton	—	14.50
Swanee Clay*	ton	—	12.50
Snobrite*	ton	—	12.50
Suprex*	lb.	10.00	14.50
Whitetex* (c.l.)	ton	53.00	—
Windsor*	ton	14.50	39.50
4200 Clay*	ton	13.00	—
Diatomaceous Earth	ton	30.00	50.00
Celatom MN-33	ton	36.00	95.00
MP-25	ton	55.00	121.00
MP-63	ton	55.00	121.00
Celite 270	ton	55.00	121.00
292	ton	36.00	95.00
315; 350	ton	137.00	225.00
Kaylorite* (c.l.)	ton	—	30.00
Lorite*	ton	—	36.00
Flock			
Cotton (White)	lb.	.28	.30
Colored	lb.	.12	.20
Filfloc F 40-9000*	lb.	—	.13
F 6000*	lb.	—	.36
Nylon	lb.	—	.35
Fovecel*	ton	110.00	210.00
Rayon, Bleached or Dyed	lb.	.75	1.20
Rayon, Grey	lb.	—	.18
Rayon, Pink	lb.	—	.20
Solka-Floc* (l.c.l.)	lb.	.07	.16
Glue, Amber	lb.	.17	.19
Ground Softwood Bark			
Silvacon* (c.l.)	ton	55.00	100.00
Leather			
Flour (dust)	lb.	.12	.13
Shredded	lb.	.05	.17
Lignin	lb.	.06	.08
Limestone, Pulverized	ton	3.00	5.00
Asbestol Regular*	ton	28.00	—
Asbestol Superfine*	ton	33.00	—
Georgia Marble No. 10*	ton	—	11.00
Industrial Filler No. 100*	ton	—	7.75
Micro Velva A*	ton	53.00	—
L*	ton	61.00	—
No. 1 White*	ton	—	11.00
Magnesium Carbonate	lb.	.10½	.13
K & M Technical* (c.l., eqld.)	lb.	.10½	.12
Marinco CL*	lb.	.11	.13
Michigan*	lb.	.11	.15
Magnesium Silicate (see Talc)			
Mica	lb.	.01¼	.07¾
Concord*	lb.	.08	.08¾
Micro-Mica*	lb.	.08	.08¾
Mineralite* (c.l.)	ton	40.00	85.00
Silversheen*	lb.	.08	.08¾
Triple A Mica* (c.l.)	ton	—	40.00
Vermiculite*	lb.	—	.11
Wet Ground Biotite Mica	lb.	.06½	.07¼
Wet Ground Mica No. 160*	lb.	.08	.08¾

FILLERS (Cont'd)

Pecan Shell Flour			
Stan Shell*	ton	45.00	75.00
Pyrophyllite			
No. 261*	ton	—	11.50
Pyrax A* (c.l.)	ton	14.50	15.00
WA* (c.l.)	ton	17.00	17.50
Sawdust, Graded	ton	14.00	35.00
Silica	ton	16.00	27.00
Extra Fine (bags) (c.l.)	ton	—	43.00
Slate, Powdered (l.c.l.)	ton	15.00	20.00
Lo-Micron Slate Flour*	lb.	—	.04½
No. 133 Slate Flour*	ton	—	4.55
Sodium Silico Aluminate			
Zeolex 23*	lb.	.06	.07
Talc (Magnesium Silicate)			
Akron Soapstone*	ton	—	9.75
Asbestol Regular*	ton	—	27.00
Eastern RC-300*	ton	—	32.00
No. 41*	ton	—	19.70
No. 549*	ton	—	63.00
French*	ton	—	59.00
No. 367*	ton	—	13.00
No. 1600*	ton	—	70.60
No. 1768*	ton	—	13.00
Nytal 200* (c.l.)	ton	—	28.00
300* (c.l.)	ton	—	38.00
Sierra Fibrene C-400*	ton	34.00	40.00
Sierra Supreme 325*	ton	51.00	56.00
Sierra White*	ton	21.75	26.75
Soapstone*	ton	—	13.00
Walnut Shell Flour	ton	55.00	100.00
Agrashell*	ton	55.00	115.00
Stan-Shell*	ton	50.00	110.00
Whiting, Commercial	ton	—	7.50
Allied Whiting*	ton	—	11.50
Camel-Carb*	ton	—	10.00
Calwhite (c.l.)	ton	—	20.00
C-C-O White*	ton	—	22.00
Georgia Marble No. 15*	ton	—	20.00
No. 10*	ton	—	20.00
Piqua No. 1 YAA* (c.l.)	ton	10.00	10.00
No. 2 LS* (c.l.)	ton	10.00	10.00
Snowflake* (c.l.)	ton	20.00	22.00
Stan-White 325*	ton	11.50	14.10
Ultrasil*	lb.	.35	.50
Veroc* (c.l.)	ton	—	11.50
Welco* (c.l.)	ton	—	10.50
York White R* (c.l)	ton	—	11.00
Wood Flour	ton	31.50	48.00

FINISHING MATERIALS, SURFACE

Beaco Finishes*	gal.	2.10	2.35
Black Out*	gal.	4.50	8.00
Calcium Hypochlorite (dms.) (cwt.)	ton	33.30	37.90
Shellac, Orange Gum	lb.	.35	.45
VanWax*	gal.	2.00	2.05

FLAME RETARDANTS

Celluflex CEF* (dms.)	lb.	—	.65
Chlorowax 40*	lb.	.15	.17½
50*	lb.	.16	.18½
70*	lb.	.18½	.20
Halowax*	lb.	.36	.46
Zinc Borate 3167*	lb.	.1920	.2020
Zyrox Compounds*	lb.	.38	.95½

LATEX MODIFIERS

Crux*	lb.	.30	.65
Foamnix*	lb.	.60	1.50
Ludox	lb.	.15	.16¾
Nopco EB*	lb.	.16¾	.18¾
EB-1*	lb.	.16¾	.18¾
EB-5*	lb.	.19½	.21½
OPD-101*	lb.	.29	.40
Picopale A-1 Emulsion	lb.	.086	.113
A-20	lb.	.089	.116
A-22	lb.	.097	.124
A-41; A-43	lb.	.0775	.0145
C-1	lb.	.091	.118
N-3	lb.	.100	.127
STAYB*	lb.	.25	.45
Syton 200	lb.	.15	.16¼
Ubatol U-2001* (t.c.)	lb.	.166	.187
U-2003* (t.c.)	lb.	.184	.208
U-2007* (t.c.)	lb.	.166	.187
U-3025* (c.l.)	lb.	.223	.235
U-3040* (c.l.)	lb.	.260	.272
U-3045* (c.l.)	lb.	.260	.272
U-3050* (c.l.)	lb.	.195	.207
Webnix*	lb.	1.25	2.00

LUBRICANTS, MOLD

Akro Gel*	lb.	—	.165
Alipal CO-433*	lb.	—	.20
CO-436*	lb.	—	.24
Aluminum Stearate Crown Brand*	lb.	.37	.42
Amine, Mixed Crude*	lb.	.19	.25
Aquadag*	lb.	3.50	4.00
Aquarex D*	lb.	—	.81
L*	lb.	—	.94
ME*	lb.	—	.82
MDL*	lb.	—	.33
WAQ*	lb.	—	.22
Armeen HT*	lb.	.34	.40
180*	lb.	.52	.56
Armid HT (flaked)*	lb.	.42	.46
0*	lb.	.39	.41
Borax, Granular (l.c.l.)	ton	89.00	94.00

LUBRICANTS, MOLD (Cont'd)

Carbowax 4000*	lb.	.31	.32
CD Mold Release B*	gal.	5.00	—
B-2*	gal.	5.00	—
Colite Concentrate* (dms.)	gal.	.90	1.15
Colite D43D*	gal.	1.15	1.40
Concentrex*	lb.	—	.25
Dag Dispersion No. 197*	lb.	1.95	2.90
D.C. 7 Compound*	lb.	4.70	5.80
D.C. Emulsion No. 7*	lb.	1.59	2.07
No. 8*	lb.	1.15	1.69
No. 35*; 35A*	lb.	1.15	1.69
No. 35B*	lb.	1.15	1.69
No. 36*	lb.	1.15	1.69
D.C. Mold Release Fluid*	lb.	2.90	3.47
Dri-Lube*	lb.	—	.22
Dry-Flo* (50 lb. bags)	lb.	21.40	—
Emulsion Lubricant A80*	lb.	—	1.20
45*	lb.	—	1.20
G-E Silicone Emulsion SM-55*	lb.	1.15	1.69
SM-61*	lb.	1.15	1.69
SM-62*	lb.	1.15	1.69
G-E Silicone Fluid SF-92*	lb.	2.90	4.05
SF-96*	lb.	2.90	4.05
Hawkeye Flake* (dlvd.)	lb.	.11½	.13¼
Igepal CO-430*	lb.	—	.29
CO-630*	lb.	—	.29
CO-530*	lb.	—	.29
Igepon AP-78*	lb.	—	.48
T-33*	lb.	—	.21
T-51*	lb.	—	.13½
Kokobace R*	lb.	.17½	.18½
Lipal 9-N*	lb.	.28	.29
7-O*	lb.	.29	.30
Lubrex	lb.	.25	.30
Lubri-Flo*	gal.	10.00	12.00
Migralube*	lb.	—	.35
ML-1027-2C*	gal.	—	2.65
ML-1028-2C*	gal.	—	2.65
Mold Lubricant No. 72 Conc.* (dms.)	gal.	—	1.90
Mold Lubricant No. 426* (d.ms.)	lb.	.18	.17
No. 735* (dms.)	gal.	—	1.25
No. 769* (dms.)	gal.	—	1.20
No. 825* (dms.)	gal.	—	2.00
No. 856* (dms.)	gal.	—	1.90
No. 880* (dms.)	gal.	—	1.19
No. 887* (dms.)	gal.	—	1.80
No. 935* (dms.)	gal.	—	1.56
No. 956* (dms.)	gal.	—	2.50
No. 965* (dms.)	gal.	—	2.15
No. 967* (dms.)	gal.	—	2.40
No. 969* (dms.)	gal.	—	1.50
No. 970* (dms.)	gal.	—	4.50
No. 975* (dms.)	gal.	—	2.85
No. 980* (dms.)	gal.	—	1.53
No. 987* (dms.)	gal.	—	2.45
A 187* (dms.)	gal.	—	1.90
A 256* (dms.)	gal.	—	1.20
A 988* (dms.)	gal.	—	2.60
Moldeze No. 3*	gal.	—	4.95
Mold-Brite*	gal.	—	1.50
Monopole Oil MD*	lb.	—	.16
MR-22 Silicone Semi-Permanent	gal.	9.95	14.95
Olate Flakes*	lb.	.23½	.24¾
Orvus WA Paste* (dms.)	lb.	—	.23¾
Plaskon Polyethylene S*	lb.	.32	.47
Poly-Brite PE-20	lb.	.28	.42
600	lb.	.42	.58
Poly-Cone 125X	lb.	1.15	1.30
1,000	lb.	.91	1.04
Polyglycol 15-200*	lb.	.25	.28¾
E4000*	lb.	.31	.37
Prodag*	lb.	.32	.60
Purity Flake* (dlvd.)	lb.	.14¾	.16½
Rubber-Flo*	gal.	1.25	2.00
Rubber-Glo*	gal.	—	.91
Rusco Mold Paste*	lb.	.25½	.32
Sericite* (l.c.l.)	ton	65.00	75.00
Silicone Oil A145*	lb.	3.22	3.61
A220* (dms.)	lb.	—	2.80
Silrex (dms.)	lb.	—	.65
Rubars*	lb.	—	.22¾
Soybean Lecithin	lb.	.13	.17
Thermalube*	lb.	—	.13¾
UC Silicone L-45*	lb.	2.90	4.61
L-522*	lb.	2.68	3.50
LE-45*	lb.	1.15	1.69
LE-450*	lb.	1.15	1.69
Ucon Lubricants*	lb.	.26¾	.27¾
Ulco Mold Soap*	lb.	.19	.29

LUBRICANTS, RUBBER

Cyclolube NN-1; NN-2; NN-3	gal.	.12½	.20½
NN-4	gal.	.13½	.21½
114	gal.	.19	.27
4053	gal.	.21	.29
Diglycol Stearate Neutral (and SE) (dms.)	lb.	—	.25
Extrud-o-Lube*	gal.	1.33	1.54
Ivory Chips*	lb.	.19¾	.20¾
LatexLube GR* (dlvd)	lb.	.19¼	.21½
No. 82-A* (450 lb. dms.)	lb.	—	.08½
Nopcowax 22-DS*	lb.	.38½	.41
Propylene Stearate (dms.)	lb.	.35	.60
Versa-Lube B*	lb.	.16	.18

LUBRICANTS, RUBBER SURFACE

Antidust	lb.	.37 -	.41
Barium Stearate	lb.	.41 -	.46
Calcium Stearate	lb.	.39 -	.44
Crown Brand*	lb.	.37 -	.42
D.C. 7 Compound*	lb.	4.70 -	5.80
D.C. 200 Fluid*	lb.	2.90 -	3.47
ELA*	lb.	— -	.82
G-E Silicone Fluid SF-92*	lb.	3.04 -	4.25
Glycerized Lubricant*	gal.	1.25 -	1.48
Glydag B*	lb.	1.60 -	2.25
Glyso-Lube* (dms.)	lb.	— -	.14
No. 3* (dms.)	lb.	— -	.14
Hydro-Zinc*	lb.	— -	.20
Latex-Lube Pigmented* (dlvd.)	lb.	.17¼ -	.19¼
R-66*	lb.	— -	.17¼
Liqui-Lube* (dlvd.)	lb.	— -	.17¾
N.F.* (dlvd.)	lb.	— -	.17¾
N.T.* (dlvd.)	lb.	— -	.16¾
Lubrex*	lb.	.27 -	.32
Lubri-Cote	gal.	.86 -	1.00
Magnesium Stearate	lb.	.42 -	.47
Crown Brand*	lb.	.40 -	.45
Polyethylene Glycol	lb.	.22 -	.26
Rexanol*	lb.	— -	.13
Rubber Free (Concentrate)*	gal.	— -	1.44
Jel*	lb.	.18 -	.21½
Separex*	lb.	.08½ -	.10½
Slab-Dip* (dms.)	lb.	— -	.17
Soybean Lecithin	lb.	.13 -	.17
Stock-Lube*	lb.	— -	.19
UC L-45*	lb.	2.90 -	4.61
L-522*	lb.	2.68 -	3.50
LE-450*	lb.	1.15 -	1.69
XL-42*	lb.	3.10 -	4.75
XLE-42*	lb.	1.22 -	1.70
XLE-420*	lb.	1.18 -	1.70
Wet Zinc*	lb.	— -	.22¼
CW*, P*	lb.	— -	.20
Zinc Stearate	lb.	.41 -	.46

MOLD CLEANERS

Actusol* (dlvd.)	gal.	1.45 -	1.65
Alkon* (dlvd.)	lb.	.16 -	.16½
CA-301*	gal.	— -	2.49
CA-302*	gal.	— -	2.63
G-O 6910*	lb.	.38 -	.40
Metso Anhydrous*	cwt.	5.70 -	7.95
Metso 99*	cwt.	5.00 -	7.25
200*	cwt.	6.70 -	8.95
Granular*	cwt.	4.45 -	6.70
Orvus Extra Granules*	lb.	.23¼ -	.24¾
Polo*	lb.	.12¾ -	—
Rubber-Sol*	gal.	2.97 -	3.97
Shelblast*	lb.	.04 -	.08¼
Sprex A.C.* (dlvd.)	lb.	.17¾ -	.18¾
Zip Mold Cleaner*	gal.	1.05 -	1.55

PEPTIZING AGENTS

Peptizer P-12*	lb.	.95 -	1.25
Pepton 22 Plasticizer*	lb.	.83 -	.86
65*	lb.	1.23 -	1.26
65B*	lb.	.83 -	.86
Pitt-Consol 640 (dms.)	lb.	— -	.42
RPA 2*	lb.	— -	.85
3*	lb.	— -	.51
3 Conc.*	lb.	— -	.85
6*	lb.	— -	1.66

PLASTICIZERS & SOFTENERS

Actisil	lb.	.26 -	.27
Acto 500*	lb.	— -	.09
Adipol BCA*	lb.	.47 -	.47½
2EH*	lb.	.42½ -	.44
10A*	lb.	.42½ -	.44
ODY*	lb.	.42½ -	.44
810*	lb.	.42½ -	.45½
XX*	lb.	.42½ -	.44
Admex 562 (dms.)	lb.	.50¾ -	.51¼
710 (dms.)	lb.	.35¾ -	.36¼
711 (dms.)	lb.	.37¾ -	.38¼
744 & 745 (dms.)	lb.	.41¾ -	.42¼
760 (dms.)	lb.	.59¾ -	.60¼
761 (dms.)	lb.	.46¾ -	.47¼
770 (dms.)	lb.	.42¼ -	.43
Anhydrol 6990*	lb.	.51 -	.56
Arneel SD*	lb.	.34 -	.40
Arolene 1980* (c.l.)	lb.	— -	.10
Aromatic Plasticizer 10* (and 25*) (dms.)	lb.	.08 -	.08½
Aromatic Tar	gal.	.0573 -	.1973
Bardol*	lb.	.02¼ -	.03¼
B*	lb.	.06¼ -	.06½
Bayol D*	gal.	— -	.382
F*	gal.	— -	.52
Bearflex 1751*	lb.	.14 -	.15
LPO*	lb.	.03 -	.04
MPO*	lb.	.03¾ -	.04¾
Beeswax, Bleached	lb.	.73 -	.75
Yellow Refined	lb.	.64 -	.65
Bondogen*	lb.	.55½ -	.60½
B.R.C. No. 20*	lb.	.0150 -	.0175
No. 21*	lb.	.02¼ -	.03
No. 22*	lb.	.02½ -	.02¾
B.R.H. 2*	lb.	.0213 -	.0351
BRS 700*	lb.	.0200 -	.0285
B.R.T. 3*	lb.	.0180 -	.0265
4*	lb.	.0250 -	.0260
7*	lb.	.0300 -	.0310

PLASTICIZERS & SOFTENERS (Cont'd)

B.R.V.*	lb.	.0475 -	.0565
Bunarex Resins*	lb.	.07 -	.08
Bunatak AH*	lb.	— -	.09½
N*	lb.	— -	.31
U*	lb.	— -	.17½
No. 90*	lb.	— -	.09
No. 210*	lb.	— -	.14
Butac*	lb.	.1635 -	.1735
Butyl Carbitol Perlargonate (dms.)	lb.	— -	.64½
Butyl Cellosolve Perlargonate (dms.)	lb.	— -	.68
Butyl Oleate	lb.	.26 -	.27
Butyl Palmitate	lb.	— -	.26½
Butyl Stearate (dms.)	lb.	.26 -	.27
Byerflux*	gal.	.24 -	.27
Califlux 510* (and 550*)	lb.	.02¾ -	.03¾
G.P.*	lb.	.01½ -	.02½
R-100*	lb.	.04¾ -	.05¾
LBL*	gal.	.17 -	.25
OSR*	lb.	.01⅞ -	—
RC*	gal.	.13½ -	.21½
TT*	lb.	.0195 -	.0295
Candelilla Wax, Prime	lb.	.53 -	.64
Refined Light	lb.	.56 -	.60
Carbowax 4000* (dms.)	lb.	.68 -	.70
Cardolite NC-103*	lb.	.36 -	.59
Carnauba Wax, Crude	lb.	.73 -	.74
Flaked	lb.	.73 -	1.25
Refined, Technical	lb.	.73 -	.74
Refined, Pure	lb.	.82 -	.86
Yellow	lb.	1.10 -	1.15
Celluflex* (dms.)			
112* (t.c., dlvd.)	lb.	— -	.32½
179-A* (t.c., dlvd.)	lb.	— -	.32½
179-C* (t.c., dlvd.)	lb.	— -	.32½
179-EG* (t.c., dlvd.)	lb.	— -	.32½
DBP* (t.c., dlvd.)	lb.	— -	.30
DOP* (t.c., dlvd.)	lb.	— -	.28½
TPP* (dms., eqld.)	lb.	— -	.40
Ceresin Wax	lb.	.12 -	.30
Chlorowax 40*	lb.	.15 -	.17½
50*	lb.	.16 -	.18½
70*	lb.	.18½ -	.20
LV*	lb.	.17 -	.19½
CTLA Polymer*	gal.	.20 -	.36
Cumar Resins*	lb.	.07 -	.19
Cyclolube OSR*	gal.	.28 -	.36
Darex DBM*	lb.	.30½ -	.34
DBP*	lb.	.30 -	.33½
DOP*	lb.	.30½ -	.33½
DIOP*	lb.	.30½ -	.33½
D.B.M.*	lb.	.32 -	.34¾
Decylbutyl Phthalate	lb.	.27 -	.29½
Degras, Common	lb.	— -	.14
Diallyl Phthalate	lb.	.51½ -	.52½
Dibenzyl Sebacate (dms.)	lb.	.93 -	.93½
Dibutoxyethyl Sebacate	lb.	— -	.61½
Dibutyl Phthalate (dms.)	lb.	.28½ -	.30
Dibutyl Sebacate	lb.	.67½ -	.68
Dicapryl Adipate (dms.)	lb.	.41½ -	.42½
Dicapryl Phthalate (dms.)	lb.	.27½ -	.29
Dicapryl Sebacate	lb.	.58 -	.59½
Di-Carbitol Phthalate (dms.)	lb.	.50 -	.50½
Dicyclohexyl Phthalate	lb.	.45 -	.46½
Diethyl Phthalate (dms.)	lb.	.27½ -	.29
Di-2-ethylhexyl Phthalate (dms.)	lb.	.27½ -	.29
Dihexyl Adipate (dms.)	lb.	.46½ -	.47½
Dihexyl Phthalate (dms.)	lb.	.32½ -	.33½
Dihexyl Sebacate (dms.)	lb.	.66 -	.66½
Diisobutyl Azelate	lb.	— -	.47¼
Diisobutyl Phthalate	lb.	.28 -	.29½
Di-iso-octyl Adipate	lb.	.42½ -	.43½
Dimethyl Phthalate (dms.)	lb.	.29 -	.30½
Dimethyl Sebacate (dms.)	lb.	1.30 -	1.30½
Dinonyl Adipate	lb.	.44½ -	.47¼
Dinopol IDO*	lb.	.28 -	.29½
MOP*	lb.	.29 -	.30½
Dioctyl Adipate (dms.)	lb.	.42½ -	.43½
Dioctyl Phthalate (dms.)	lb.	.27½ -	.29
Dioctyl Sebacate (dms.)	lb.	.61¼ -	.62¼
D.I.O.P. (dms.)	lb.	.27½ -	.29
Dipolymer Oil	gal.	.33 -	.48
Dispersing Oil No. 10*	lb.	.06 -	.06¼
Dutrex* 1, 6, 7	gal.	.18 -	.23
6H	gal.	.13 -	—
15E	gal.	.11 -	.23
20, 25	lb.	.03 -	.06
33	gal.	.21 -	.33
DX-111	lb.	.13½ -	.14¼
DX-111 NS	lb.	.14¼ -	.15¼
DX-40	lb.	.13¾ -	.14¾
Elastex 10-P*	lb.	.30½ -	.33½
50-B*	lb.	.25 -	.28
DCHP*	lb.	.59 -	.60
Emulphor EL-719*	lb.	— -	.58
Epoxy Plasticizer	lb.	.33½ -	.36
Drapex 3.2*	lb.	.39¼ -	.40¼
Drapex 4.4*	lb.	.34¾ -	.35¾
Drapex 7.7*	lb.	.37 -	.38
Esparto Wax	lb.	— -	.55
Estac*	lb.	— -	.16
Facile Gum 4A*	lb.	.48 -	.50
Flexol B-400*	lb.	.29 -	.30
DOP*	lb.	.29 -	.30½
TOF*	lb.	.47 -	.48
3GH*	lb.	— -	.46¾
3GO*	lb.	— -	.55¾
4GO*	lb.	— -	.36½
426*	lb.	.28½ -	.30
Flexricin P-1*	lb.	.33½ -	.36½
P-4*	lb.	.30½ -	.33¼
P-6*	lb.	.37 -	.40
P-8*	lb.	.30¼ -	.33¼

PLASTICIZERS & SOFTENERS (Cont'd)

Fortex A* (dms.)	lb.	.12½ -	.14½
Fura-Tone NC-1008*	lb.	.28 -	.39
Galex W-100*	lb.	.15½ -	.19¼
Good-rite GP233*	lb.	.40 -	.43½
GP235*	lb.	.40 -	.43½
GP236*	lb.	.40 -	.43½
GP261*	lb.	.28 -	.31½
GP265*	lb.	.28½ -	.32
GP266*	lb.	.29 -	.32½
GP-266-BPA*	lb.	.29 -	.32½
Hallco C-255-NS*	gal.	.27½ -	.29½
C-566*	lb.	.11 -	.13
Harflex 300* (dms.)	lb.	.60½ -	.61
325* (dms.)	lb.	.45 -	.45½
375* (dms.)	lb.	.76 -	.76½
500* (dms.)	lb.	.34 -	.35
HB20*	lb.	.17 -	.18½
HB40*	lb.	.21½ -	.23
Herron-H.T.*	gal.	.16 -	.27
Herron-Plas*	lb.	— -	.03¾
Herron-Wax*	lb.	.05¼ -	.06
No. 23*	lb.	.08¼ -	.08¾
No. 24*	lb.	.07¼ -	.07¾
HSC No. 13*	lb.	.25 -	.32
No. 39*	lb.	.22 -	.29
Indonex W-2*	gal.	.12 -	—
Isooctyl Decyl Phthalate (dms.)	lb.	.28 -	.29½
Kapsol*	lb.	.35 -	.35½
Kenflex A & N*	lb.	.19 -	.34
Kesscoflex BCL* (dms.)	lb.	— -	.37
BCO* (dms.)	lb.	— -	.33
BCP* (dms.)	lb.	— -	.36
BCS* (dms.)	lb.	— -	.32
BO* (dms.)	lb.	— -	.28¼
BS* (dms.)	lb.	— -	.27½
DBT* (dms.)	lb.	— -	.68
DIOA* (dms.)	lb.	— -	.43½
DOA* (dms.)	lb.	— -	.43½
MCO* (dms.)	lb.	— -	.35½
MCP* (dms.)	lb.	— -	.41
MCS* (dms.)	lb.	— -	.35
TRA* (dms.)	lb	— -	.40
KP 23*	lb.	.32½ -	.33½
90*	lb.	.42½ -	.43½
140*	lb.	.48 -	.48½
201*	lb.	.45 -	.46½
260*	lb.	.36½ -	.37½
Kremol 40*	gal.	.36 -	.46
50*	gal.	.39 -	.49
Kronisol* (dms.)	lb.	.37½ -	.38½
Kronitex AA* (dms.)	lb.	.35 -	.36
I, K-3, MX*	lb.	.35 -	.36
Lanolin, Tech. Anhydrous	lb.	— -	.26
Latex-Lube G.R.*	lb.	.19¼ -	.20
Lead Oleate	lb.	— -	.29¾
Lindol* (dms., t.c.)	lb.	— -	.32½
Locusol No. 1-6980*	lb.	.30 -	.34
2-Mercaptoethanol (dms.)	lb.	1.25 -	1.50
Methox*	lb.	.40½ -	.41
Methyl Laurate	lb.	.25 -	.27
Methyl Oleate	lb.	— -	.20
Methyl Stearate (dms.)	lb.	— -	.30
Monoplex DOS*	lb.	.59½ -	.60½
DBS*	lb.	.65½ -	.66½
S-70*	lb.	.41 -	.42
S-71*	lb.	.46½ -	.47½
Montan Wax, Crude	lb.	.21 -	.26
Flaked	lb.	.29 -	.29
Morflex*	lb.	.32 -	.69½
Natac*	lb.	.1585 -	.1685
Nebony Resins* (dms.)	lb.	.04½ -	.05½
Neolene 210* (t.c.)	lb.	— -	.16
212* (t.c.)	lb.	— -	.14
220* (t.c.)	lb.	— -	.15
Nerium*	lb.	— -	.09
Nevillac Resins* (dms.)	lb.	.31 -	.85
Neville LX-880* (dms.)	lb.	.12 -	.13½
LX-685* (dms.)	lb.	.12 -	.17½
LX-782 (dms.)	lb.	.07½ -	.08½
LX-828* (dms.)	lb.	.11 -	.12½
LX-1000* (dms.)	lb.	.12 -	.13
Neville Resins* (dms.)	lb.	.07¼ -	.20
Nevindene Resins* (dms.)	lb.	.16½ -	.20
Nevinol* (dms.)	lb.	— -	.24
No. 480 Oil Proof Resin*	lb.	— -	.18
Ohop[illegible] Q10* (dms.)	lb.	.29 -	.30½
R6* (dms.)	lb.	.37¼ -	.37¾
OPL*	lb.	.29 -	.40
Ortho-Nitrobiphenyl	lb.	.13 -	.15
Ozokerite Wax, White and Yellow	lb.	.24 -	.31
Panaflex BN-1*	lb.	.18 -	.22¼
Paradene Resins (dms.)	lb.	.07¼ -	.08
No. 2 Flaked	lb.	.08 -	.08½
Para Flux* (dms.)	gal.	.22 -	.25
2016* (dms.)	gal.	.22 -	.26
Para Lube* (t.c.l.)	lb.	.046 -	.048
Paraplex G-25*	lb.	.76 -	.77
G-40*	lb.	.50 -	.51
G-50*	lb.	.40¾ -	.41¾
G-53*	lb.	.45 -	.46
G-60* (and G-61*)	lb.	.32¼ -	.32¼
G-62*	lb.	.33¼ -	.33¾
Parmo*	lb.	.06 -	.13¼
Peroxidol 780*	lb.	.33¼ -	.36¼
781*	lb.	.34¼ -	.37¾
Petroflux MV*	gal.	.097 -	.177
Petrolatum (dms.)	lb.	.04¼ -	.14½

PLASTICIZERS & SOFTENERS (Cont'd)

PG-16*	lb.	——	.35
Philrich-5* (t.c.)	gal.	——	.12½
Picco 10* (and 25*)	lb.	.15	.15½
50* (and 75*)	lb.	.14½	.15
100*	lb.	.14½	.17
Piccocizer 30*	lb.	.06½	.07
Piccoplastic A* (B*, C*, D* & E*)	lb.	.24	.25
FT* (FHX* & FX*)	lb.	.1695	.1745
T-135*	lb.	.19	.20
Piccolyte S Resins*	lb.	.20½	.21½
Piccopale Resins*	lb.	.12	.13
Piccoumaron Resins*	lb.	.07	.18
Pigmentar* Pigmentaroil*	lb.	.510	.684
Pitt-Consol 500* (dms.)	lb.	.30	.30½
Plastac M*	lb.	—	—
Plasticil	lb.	.10½	.11¾
NS	lb.	.11½	.12¾
Plasticizer 2286*	lb.	—	.36½
Plasticizer 4141*	lb.	.42½	.43½
Plasticizer DP-200, DP-250, DP-520*	lb.	.45	.45¾
DP-316*	lb.	.42¾	.43½
DP-317*	lb.	.46	.47¼
DP-8732*	lb.	.44¾	.46
Plasticizer LP*	lb.	——	.07
Plasticizer MP*	lb.	——	.08
Plasticizer MT-511*	lb.	——	.69¼
Plasticizer OLN*	lb.	.36	.42
Plasticizer SC*	lb.	.42	.46
Plasticizer W-13*	lb.	.37	.38¾
Plastoflex 3*	lb.	——	.52
52*	lb.	.37¾	.38¾
VS*	lb.	.41¾	.42¾
Plastogen*	lb.	.08¾	.09
Plastolein 9050* (c.l.)	lb.	.54½	.56½
9055*	lb.	.30½	.32½
9058*	lb.	.48	.50
9250*	lb.	.38¼	.40¾
9715*	lb.	.39	.40
Plastone	lb.	.23	.27
Polycizer 162*	lb.	.27½	.29
332*	lb.	.42½	.44
562*	lb.	.28	.29½
662*	lb.	.28½	.30
532 and 632*	lb.	.42½	.44
ED*	lb.	——	.45
Polyco 438*	lb.	.34	.35
Polymel C-130*	lb.	.13¾	.14¾
D*	lb.	.22½	.23½
6*	lb.	.06¾	.07¾
Poly-Sperse AP-2	lb.	.23	.29½
AP-300, LC-20	lb.	.26	.32½
Poly-Sperse R-100	lb.	.17	.23½
Process Oil C-255* (c.l.)	gal.	.27½	.29½
Propylene Stearate (dms.)	lb.	——	.32
PRR 1*	gal.	.15	.35
PT 101 Pine Tar Oil* (t.c., dms.)	lb.	.0380	.0554
400 Pine Tar* (600* & 800*) (t.c., dms.)	lb.	.0380	.0554
PX-5	lb.	.21½	.22½
PX-7	lb.	.24	.25
PX-104* (dms.)	lb.	.28½	.30
PX-108* (dms.)	lb.	.27½	.29
PX-138* (dms.)	lb.	.27½	.29
PX-208* & 238* (dms.)	lb.	.42½	.43½
PX-404* (dms.)	lb.	.67½	.68½
PX-438* (dms.)	lb.	.61¼	.62¼
PX-800* (dms.)	lb.	.35¼	.36¼
PX-917* (dms.)	lb.	.35	.36
RC Plasticizer B-17* (dms.)	lb.	.23½	.24½
O-16* (dms.)	lb.	.30	.31
TG-8*&TG-9* (dms.)	lb.	.34½	.35½
TG-85* (dms.)	lb.	.36½	.37½
RC Polymeric BGA* (dms.)	lb.	.45½	.46½
Reogen*	lb.	.14¼	.14½
Resin C*	lb.	.0225	.0310
731D	lb.	.17⅛	.18⅜
Resinex*	lb.	.03¾	.05½
L-4*	lb.	.02¼	.04¼
Rexflex*	lb.	——	.15
Rosin Oil	gal.	.80	1.35
RR-10 (Neoprene)*	lb.	——	.37
R.S.O. Softening Oil*	lb.	.03	.05
RuBars*	lb.	.19¼	.20
Rubberol*	lb.	.18	.25¾
Santicizer B-16*	lb.	.46¾	.47¾
E-15*	lb.	.53	.54
M-17*	lb.	.44	.45
No. 140*	lb.	.35	.36
No. 141*	lb.	.36½	.37½
No. 160*	lb.	.27½	.29
No. 602*	lb.	——	.28½
No. 603*	lb.	.27	——
Sherolatum*	lb.	.03½	.06
Staflex DBES*	lb.	.58½	.61½
DOS*	lb.	.59¼	.62¼
IXA*	lb.	.32	.35
KA*	lb.	.34	.36¾
Stan Chlor Oils*	lb.	.13½	.20½
70*	lb.	.17½	.30
Stanolind Petrolatum*	lb.	.07	.156
Wax*	lb.	.31	.33
Staybelite Resin	lb.	.13¾	.15
Sunny South Burgundy Pitch*	lb.	.123	.1285
Rosin Oil*	gal.	.605	.76
Superla Wax*	lb.	.30	.397
Syncera Wax*	lb.	.16	.267
Syn Tac* (c.l.)	gal.	——	.33
Synthetic Revertant Oil	lb.	——	.16
Tar, Refined	gal.	.1200	.1760
Tarpine	lb.	.035	.050

PLASTICIZERS & SOFTENERS (Cont'd)

Terpene A*	gal.	——	.65
Tetraflex R-122*	lb.	.27	.30½
TP-90B*	lb.	.59	.60
TP-95*	lb.	.65	.75
Transphalt Resins*	lb.	.03¾	.05¾
Tributyl Phosphate	lb.	.52½	.53½
Tricresyl Phosphate	lb.	.35	.36
Triphenyl Phosphate	lb.	.41½	.43½
Turgum S*	lb.	.1460	.1560
Turgum SB*	lb.	.09½	.10½
Turpol XC-1200*	lb.	.67	.70
XC-1300*	lb.	——	.50
Vistac No. 1*	gal.	1.00	1.21
P*	lb.	.18	.18½
Vopcolene 50*	lb.	——	.31
Witcizer 100*	lb.	.26	.27
200*	lb.	.22¼	.25¼
300*	lb.	.30	.33
312*, 313*	lb.	.28	.31½
412*	lb.	.42½	.46

PROCESSING AIDS

Castor Oil, Blown (dms.)	lb.	.25½	.26¼
Refined (dms.)	lb.	——	.18½
Castorwax*	lb.	.25	.31
Dutrex 7*	lb.	.12	.20
ELA*	lb.	——	.82
Foamnix*	lb.	.60	1.50
Hydrotol Glycerides 200*	lb.	.15½	.19¼
Kenflex N*	lb.	.19	.26
Maleic Anhydride	lb.	——	.27
Millrex*	lb.	——	.15
Nadic Anhydride	lb.	——	.75
Polycin*	lb.	——	.24½
R-B-H Resin 510*	lb.	.19	.26
530*	lb.	.25	.32
STAYB*	lb.	.25	.45
Thiomalic Acid	lb.	——	3.50
Webnix*	lb.	1.25	2.00
Zyrox*	lb.	.78	.88

PROTECTIVE & STABILIZING AGENTS

Acacia*	lb.	.12¼	.21
Alcogum*	lb.	.08½	.24
Alpha Protein	lb.	——	.23
Aroostoucrat*	lb.	——	.07½
Carob Bean Flour	lb.	——	.50
Casein	lb.	.22	.35
Emcol K-8300* (dms.)	lb.	.14	.18
Ethylene Diamine 68%	lb.	.44	.47
Gum Arabic	lb.	——	.23
Karaya Gum	lb.	——	.35
Locust Bean Gum	lb.	——	.50
Modicol VD*	lb.	.13⅜	.15⅞
Prosem*	lb.	——	.06
Stablex B*	lb.	.50	.95
K*	lb.	.27	.35

RECLAIMING AGENTS

Amalgamator Z-4*	lb.	.34	.35
Armeen C*	lb.	.46	.52
Mixed Crude*	lb.	.19	.25
T*	lb.	.32	.38
Blend No. 27 Oil	gal.	.35	.42
Burco RA*	lb	.05	.081
BWH-1*	gal.	.16	.17
C-6 Oil* (28* & 32*)	gal.	.33	.38
C-10 Oil*	gal.	.25	.30
C-33* (t.c.)	gal.	——	.21½
C-42* (t.c.)	gal.	——	.23
Caustic Soda—Flake 76% (c.l., dms.)	cwt.	——	5.20
Liquid 50% (t.c.)	cwt.	——	2.90
Solid 76% (c.l., dms.)	cwt.	——	4.80
Cresylic Acid (99-100%)	gal.	.85	1.39
D-4* (t.c.)	gal.	——	.27
E-5* (t.c.)	gal.	——	.25
Flake Calcium Chloride (77-80%)	ton	——	31.00
(94-97%)	ton	——	39.80
Gensol No. 6* (t.c.)	gal.	——	.42
Heavy Aromatic Naphtha	gal.	.13¼	.18½
LX-572 Reclaiming Oil*	gal.	.27	.32
LX-777 Reclaiming Oil*	gal.	.23	.33
Neo-Fat D-242*	lb.	.05½	.07¾
42-70*	lb.	.08¼	.10¼
No. 517 H.B. Oil*	gal.	.11½	.16½
535*	gal.	.22	.27
Nucom* (t.c.)	gal.	——	.42
Pitt-Consol 500 (dms.)	lb.	.30	.30½
640 (dms.)	lb.	.42	.42
PT 101 Pine Tar Oil* (t.c., dms.)	lb.	.0380	.0554
Q Oil* (t.c.)	gal.	——	.286
Reclaiming Oil 3186-G*	gal.	.26	.33
Reclaiming Reagent No. 1431*	lb.	.21	.25
R.P.A. No. 3*	lb.	——	.51
RR-10*	lb.	——	.37
Soda Ash (c.l., bags)	cwt.	——	1.85
Solvenol No. 1	gal.	.50	.67
No. 2	gal.	.41	.62
Solvent 534*	gal.	.20½	.26½
Solvent Oil 21*	gal.	.24	.29
C-42*	gal.	.23	.38
701 Oil*	gal.	.27	.29

REINFORCING AGENTS—CARBON BLACK

Channel, Hard Processing (HPC) (bags)

Dixiedensed (and S)*	lb.	.0775	.1550
Kosmobile (and S)*	lb.	.0775	.1550

REINFORCING AGENTS—CARBON BLACK (Cont'd)

Channel, Medium Processing (MPC) (bags)

Arrow MPC*	lb.	.0850	.1625
Continental A*	lb.	.0850	.1625
Dixiedensed HR (and S-66)	lb.	.0850	.1625
Kosmobile HM (and S-66)	lb.	.0850	.1625
Micronex Standard*	lb.	.0850	.1625
Spheron 6*	lb.	.0850	.1625
Texas M*	lb.	.0850	.1625
Witco No. 1*	lb.	.0850	.1625

Channel, Easy Processing (EPC) (bags)

Collocarb*	lb.	.0710	.1485
Continental AA*	lb.	.0850	.1625
Dixiedensed 77*	lb.	.0850	.1625
Kosmobile 77*	lb.	.0850	.1625
Micronex W-6*	lb.	.0850	.1625
Spheron 9*	lb.	.0850	.1625
Texas E*	lb.	.0850	.1625
Witco No. 12*	lb.	.0850	.1625
Wyex EPC*	lb.	.0850	.1625

Channel, Conductive (CC) (bags)

Continental R-40*	lb.	.2600	.3500
Dixie 5 Dustless*	lb.	.1350	.2200
Dixie Voltex*	lb.	.2600	.3500
Kosmink Dustless*	lb.	.1350	.2200
Kosmos Voltex	lb.	.2600	.3500
Texas MC-74-BD*	lb.	.2600	.3500
Voltex*	lb.	.2600	.3500

Conductive Furnace Black (CF) (bags)

Aromex CF*	lb.	.0875	.1550
Continex CF*	lb.	.1100	.1700
Dixie CF*	lb.	.0925	.1600
Kosmos CF*	lb.	.0925	.1600
Shawinigan Acetylene Black*	lb.	——	.1900
Vulcan C*	lb.	.1100	.1850

Extra-Conductive Furnace Black (ECF) (bags)

Vulcan XC-72 (pellets)*	lb.	.2500	.3400

Furnace, Fast Extruding (FEF) (bags)

Arovel FEF*	lb.	.0675	.1350
Continex FEF*	lb.	.0675	.1350
Dixie 50*	lb.	.0675	.1350
Kosmos 50*	lb.	.0675	.1350
Philblack A*	lb.	.0675	.1350
Statex M*	lb.	.0675	.1350
Sterling SO*	lb.	.0675	.1350

Furnace, Fine (FF) (bags)

Statex B*	lb.	.0725	.1400
Sterling 99*	lb.	.0725	.1400

Furnace, General Purpose (GPF) (bags)

Arogen GPF*	lb.	.0600	.1275
Continex GPF*	lb.	.0600	.1275
Dixie 35*	lb.	.0600	.1275
Kosmos 35*	lb.	.0600	.1275
Statex G*	lb.	.0600	.1275
Sterling V*	lb.	.0600	.1275
V (Non-Staining)	lb.	.0600	.1275

Furnace, High Abrasion (HAF) (bags)

Aromex HAF*	lb.	.0775	.1450
Continex HAF*	lb.	.0775	.1450
Dixie 60*	lb.	.0775	.1450
Kosmos 60*	lb.	.0775	.1450
Philblack O*	lb.	.0775	.1450
Statex R*	lb.	.0775	.1450
Vulcan 3*	lb.	.0775	.1450

Furnace, High Modulus (HMF) (bags)

Continex HMF*	lb.	.0625	.1300
Dixie 40*	lb.	.0625	.1300
Kosmos 40*	lb.	.0625	.1300
Modulex HMF*	lb.	.0625	.1300
Statex 93*	lb.	.0625	.1300
Sterling L* and LL*	lb.	.0625	.1300

Furnace, Semi-Reinforcing (SRF) (bags)

Continex SRF*	lb.	.0575	.1250
Dixie 20*	lb.	.0575	.1250
Essex SRF*	lb.	.0575	.1250
Furnex*	lb.	.0575	.1250
Gastex*	lb.	.0625	.1350
Kosmos 20*	lb.	.0575	.1250
Pelletex* and NS*	lb.	.0575	.1250
Regal*	lb.	.0575	.1250
Shawinigan Acetylene Black*	lb.	——	.1900
Sterling NS* and S*	lb.	.0575	.1250
R*	lb.	.0625	.1350

FRENCH

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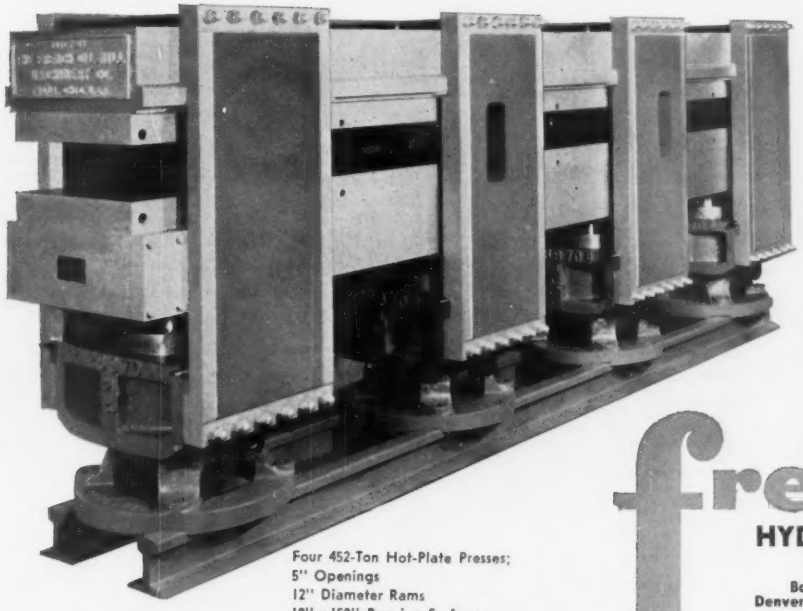

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REINFORCING AGENTS—CARBON BLACK (Cont'd)

Furnace Super Abrasion (SAF) (bags)

Dixie 85	lb.	.1150	-	.1750
Kosmos 85	lb.	.1150	-	.1750
Philblack E*	lb.	.1150	-	.1900
Statex 160*	lb.	.1150	-	.1900
Vulcan 9*	lb.	.1150	-	.1900

Furnace, Super Abrasion, Intermediate (ISAF) (bags)

Aromex ISAF*	lb.	.0925	-	.1600
Continex ISAF*	lb.	.0925	-	.1600
Dixie 70*	lb.	.0925	-	.1600
Kosmos 70*	lb.	.0925	-	.1600
Philblack I*	lb.	.0925	-	.1600
Statex 125*	lb.	.0925	-	.1600
Vulcan 6*	lb.	.0925	-	.1600

Furnace, Super Conductive (SCF) (bags)

Conductex SC*	lb.	.1150	-	.1800
Vulcan SC*	lb.	.1800	-	.2550

Thermal, Fine (FT) (bags)

P-33 (c.l.)*	lb.	——	-	.0625
Sterling FT (c.l.)	lb.	——	-	.0625

Thermal, Medium (MT) (bags)

Shellblack*(†)	lb.	——	-	**.0250**
Sterling MT (c.l.)	lb.	——	-	.0450
MT Non-Staining (c.l.)*	lb.	——	-	.0550
Thermax (c.l.)*	lb.	——	-	.0450
Stainless (c.l.)	lb.	——	-	.0550

Specialty Blacks (Awaiting Classification)

Regal 300*	lb.	.0775	-	.1450
Regal 600*	lb.	.0925	-	.1600

REINFORCING AGENTS—SILICA

Cab-o-sil*	lb.	.66	-	1.25
D. C. Silica (pelletized)*	lb.	1.45	-	1.65
Hi-Sil 233*	lb.	.08¼	-	.09¾
X303*	lb.	.50	-	.60
Santocel*	lb.	**.62**	-	**.64**
Ultrasil VN-3*	lb.	.35	-	.65
Valron Estersil*	lb.	**2.00**	-	**2.25**

REINFORCING AGENTS—MISCELLANEOUS

Angelo Shellac*	lb.	.40	-	.50
Cato 2* (100 lb. bag)	lb.	17.00	-	——
Darex Copolymer No. 3*	lb.	**.47**	-	**.49**
43G*	lb.	**.39**	-	**.41**
Darex Copolymer Latex No. 3-L	lb.	.41½	-	.46
Durez 12687 (and 12707)*	lb.	.36½	-	.40
Durez 13355*	lb.	.27½	-	.31½
Dymerex Resin	lb.	.15¾	-	.17
Good-rite Resin 2007*	lb.	.36	-	.38
2057*	lb.	.30	-	.31
Hystron*	lb.	.39	-	.41
Kralac A-EP*	lb.	.39	-	.41
Lampblack	lb.	——	-	**.12**
Marbon 8000*	lb.	.36	-	.43
Marmix*	lb.	.35	-	.43
Mistron Vapor*	lb.	——	-	.03½
HGO-55*	lb.	——	-	.05
Pliolite Latex 150*	lb.	.35	-	.39
Pliolite Resin-Rubber Masterbatches*	lb.	.33	-	.57
Pliolite NR*	lb.	.93	-	.95
S6B*	lb.	.36	-	.43
Plio-Tuf G85C*	lb.	.52	-	.54
Polyco 220*	lb.	**.18¼**	-	**.19¼**
Poly-Phen 201-C; 218-C	lb.	.27½	-	.29
202-C	lb.	.36	-	.37½
Polypol S-70*	lb.	.25	-	.26

RETARDERS

Akron Benzoic Acid TBAO-2*	lb.	.41	-	.43
Dutch Boy Normasal*	lb.	——	-	**.46**
ESEN*	lb.	.39	-	.41
Good-rite Vultrol*	lb.	**.67**	-	**.70**
Harcopol 1183*	lb.	**.70**	-	**.74**
Retarder J*	lb.	.68	-	.70
PD*	lb.	.39	-	.41
W*	lb.	——	-	.46
Retardex*	lb.	**.46**	-	**.46**
TCM-25*	lb.	.60	-	.70
Wiltrol P	lb.	.37	-	.39

RUBBER SUBSTITUTES

Mineral Rubber

Byerlyte*	ton	55.00	-	62.00
Hard Hydrocarbon (dms.)*	ton	**53.00**	-	**60.00**
Herron Flake*	ton	——	-	**45.00**
Mineral Rubber, Solid	ton	**42.50**	-	**44.50**
M. R. No. 38*	ton	**57.00**	-	**70.00**

RUBBER SUBSTITUTES (Cont'd)

Vulcanized Vegetable Oils

Amberex*	lb.	**.29**	-	**.36**
Brown	lb.	.15	-	.24
Car-Bel-Lite*	lb.	.33½	-	.36
Neophax*	lb.	.17	-	.27
Car-Bel-Rex A and C*	lb.	——	-	.126
White	lb.	.15	-	.26
670 Brown	lb.	.14¼	-	.14¾

Miscellaneous Rubber Substitutes

Gilsowax B*	lb.	**.09**	-	**.11**
Resin No. 1098 (dms.)	lb.	——	-	**.62**
No. 1198*	lb.	**.46¾**	-	**.49¾**
Tysonite*	lb.	.26	-	.26¾

SOLVENTS

Acetone (dlvd.)	lb.	.11	-	.12½
Amsco Lactol Spirits*				
(t.c.)	gal.	——	-	.20
Naphthol Spirits*	gal.	——	-	.19
Mineral Spirits*	gal.	——	-	.18
Rubber Solvent* (t.c.)	gal.	——	-	.19
Solv A* (t.c.)	gal.	——	-	.22
Solv A-80* (t.c.)	gal.	——	-	.23½
Solv B* (t.c)	gal.	——	-	.28
Solv B-90* (t.c.)	gal.	——	-	.31
Solv D* (t.c.)	gal.	——	-	**.30**
Solv E*	gal.	——	-	**.30**
Solv F*	gal.	——	-	**.30**
Solv F-80*	gal.	——	-	.32
Solv G*	gal.	——	-	.36
Special Naphtholite* (t.c.)	gal.	——	-	.19
Special Textile Spirits*	gal.	——	-	.20
Super Hi-Flash Naphtha*	gal.	——	-	.34
Super Naphtholite*	gal.	——	-	.19
Textile Spirits* (t.c.)	gal.	——	-	.20
Amyl Chlorides, Mixed (l.c.l.) (dms.)	lb.	——	-	.11
Benzol 90%	gal.	**.36**	-	**.40**
Butyl Acetate	lb.	.17	-	.18½
Butyl Alcohol	lb.	.17	-	.19½
Secondary (dlvd.)	lb.	.15	-	.16½
Tertiary (dlvd.)	lb.	.15	-	.16½
Carbon Bisulfide, Tech.	lb.	.07	-	.08½
Carbon Tetrachloride	lb.	.10¾	-	.14¼
Cosol 1*	gal.	**.37**	-	**.43**
2*	gal.	**.42**	-	**.48**
Cyclohexane	gal.	.77	-	110.00
85% (c.l.) (dms.)	gal.	——	-	.56
Cyclohexanone	lb.	.31	-	.34½
Diacetone, Pure (dlvd.)	lb.	.15½	-	.17
Dichlorethyl Ether (dms.)	lb.	.15½	-	.16½
Dichloropentanes (l.c.l.) (dms.)	lb.	——	-	.06
Dicom*	gal.	——	-	.55
Halowax Oil*	lb.	**.28**	-	**.41**
Heptanes* (t.c.)	gal.	——	-	.1609
Hexanes (t.c.)	gal.	——	-	.1584
Isobutyl Acetate	lb.	.15¼	-	.16¾
Isopropyl Alcohol, Ref. 99% (dlvd.)	gal.	.62	-	.72
Ether, Ref. (dlvd.)	lb.	.09½	-	.11
Mersol*	gal.	**.43**	-	**.79**
Mesityl Oxide (dlvd.)	lb.	.15	-	.16½
Methyl Acetone, Syn. (dms., dlvd.)	gal.	.66	-	.72
Methyl Chloride	lb.	——	-	.12¾
Methyl Ethyl Ketone	lb.	.15	-	.16½
Methyl Isobutyl Ketone (dlvd.)	lb.	.17	-	.18½
Methylene Chloride	lb.	——	-	.12½
N-5 Pentane Mix* (t.c.)	gal.	——	-	.13½
M-6 Hexanes* (t.c.)	gal.	——	-	.14½
N-7 Hexanes* (t.c.)	gal.	——	-	.13½
Nelio Dipentene	gal.	.41	-	.62
Penetrell*	gal.	.41	-	.42
Perchlorethylene	lb.	.11¾	-	.15¼
Petrolene* (t.c.)	gal.	——	-	**.14125**
Picolines, Alpha, Refined.	lb.	**.43½**	-	**.44**
Mixed	lb.	.32½	-	.33
Proprietary Solvent (dms.)	gal.	.66	-	.77
Propyl Acetate (t.c., dlvd.)	lb.	——	-	.11¾
Alcohol (t.c., dlvd.)	lb.	——	-	.11
Pyridine, Refined	lb.	.69½	-	.70
Quinoline	lb.	.50¾	-	.51¼
Rubber Solvent (t.c.)	gal.	——	-	**.16**
Rubsol (t.c.)	gal.	——	-	**.12875**
Skellysolve B (Hexanes)* (t.c.)	gal.	——	-	.16
C (Heptanes)* (t.c.)	gal.	——	-	.16¼
R (Rubber Solvent)*	gal.	——	-	.1390
Solvent, Crude, Light	gal.	**.19**	-	**.28**
Solvesso 100* (t.c.)	gal.	.33	-	.35
150 (t.c.)	gal.	.33	-	——
Sunny South DD Dipentine*	gal.	**.41**	-	**.62**
Sunny South DD Pine Oil*	lb.	——	-	**.15**
Sunray*	gal.	**.1140**	-	**.1600**
Toluene (dms.)	gal.	——	-	**.38**
Toluol (t.c.)	gal.	.25	-	.25
Trichlorethane	lb.	——	-	.12¾
Trichlorethylene	lb.	.12	-	.16¾
Triglycol Dichloride	lb.	**.63**	-	**.64**
Union Thinner 1* (t.c.)	gal.	——	-	.174
5* (dms.)	gal.	——	-	.199
7* (t.c.)	gal.	——	-	.164
2-50 W Hi-Flash*	gal.	——	-	**.41**
Xylol (t.c.)	gal.	.29	-	.30

STABILIZING AGENTS (for Vinyl Resins)

Advastab BC-12*	lb.	.90	-	.95
BC-74*	lb.	.70	-	.75
BC-105*	lb.	.75	-	.80
CH-101*; CH-201*	lb.	.60	-	.65
E-82*	lb.	.90	-	.95
JCX*	lb.	.62	-	.67
L Paste*	lb.	.65	-	.70
SN*	lb.	.47	-	.52
T-10*	lb.	1.90	-	1.95
T-50-LT*	lb.	3.20	-	3.25
XBZ-155*	lb.	.69	-	.74
XC-143*	lb.	.90	-	.95
XE-98*	lb.	.53	-	.58
Amioca 50* 85* (bags)	lb.	11.11	-	11.26
Barca 10*	lb.	.65	-	.70
Barium Stearate	lb.	.41	-	.46
Basic Silicate White Lead	lb.	.16½	-	.17½
Cadmium Ricinoleate	lb.	——	-	**2.00**
Calcium Ricinoleate	lb.	——	-	**.55**
Dutch Boy DS-207*	lb.	——	-	**.54**
B*	lb.	——	-	.32½
Tribase*	lb.	——	-	.27½
Dythal*	lb.	——	-	**.39½**
Ferro 182* (dms.)	lb.	.70	-	.76
200* (dms.)	lb.	**1.33**	-	**1.43**
203* (dms.)	lb.	.87	-	.91
541* (dms.)	lb.	.35½	-	.45½
541A* (dms.)	lb.	.82	-	.86
700* (dms.)	lb.	**.48¾**	-	**.58¾**
900* (dms.)	lb.	.90	-	.94
903* (dms.)	lb.	.60	-	.64
909* (dms.)	lb.	.91	-	.95
920*	lb.	——	-	**.98**
931* (dms.)	lb.	**.75¾**	-	**.85¾**
993* (dms.)	lb.	.89	-	.99
1203* (dms.)	lb.	1.30	-	1.40
1206* (dms.)	lb.	1.32	-	1.36
1820* (dms.)	lb.	.90	-	.94
1825* (dms.)	lb.	1.00	-	1.04
1976*	lb.	.47	-	.51
Harshaw 1-V-3*	lb.	.43	-	.45
1-V-4*	lb.	.68	-	.70
1-V-7*	lb.	**.70**	-	**.72**
2-V-4*	lb.	.85	-	.87
2-V-8*	lb.	1.31	-	1.33
5-V-1*	lb.	.41	-	.43
6-V-1B*	lb.	——	-	.55
6-V-2*	lb.	——	-	.55
6-V-6*	lb.	——	-	.55
6V-10*	lb.	——	-	.55
7-V-2*	lb.	.93	-	.95
8-V-1*	lb.	.82	-	.84
8-V-100*	lb.	.82	-	.84
9-V-1*	lb.	.70	-	.72
12-V-5*	lb.	73	-	.75
24-V-1*	lb.	1.10	-	1.12
128-V-5*	lb.	.86	-	.88
Istabelan **No. 115 Liquid**	lb.	.85	-	.95
No. 120 Liquid	lb.	.65	-	.75
Kosol* (50 lb. bags)	lb.	19.00	-	——
Lithium Stearate	lb.	.52	-	.57
Fluffy	lb.	**.47½**	-	**.70**
Standard	lb.	**.52½**	-	**.75**
Mark A*	lb.	2.80	-	3.15
C*	lb.	.81	-	.84
E*	lb.	.72	-	.75
GS*	lb.	.77	-	.80
LL*	lb.	.59	-	.62
KCB*	lb.	.59	-	.62
M*	lb.	**.59**	-	**.62**
PL*	lb.	.62	-	.65
TT*	lb.	.72	-	.75
WS*	lb.	.97	-	1.00
X*	lb.	2.50	-	2.75
XI*	lb.	.87	-	.90
XV*	lb.	.84	-	.87
XX*	lb.	.57	-	.60
33*; 34*; 35*	lb.	.97	-	1.00
Metasap 613-A*	lb.	——	-	**.69**
613-B*	lb.	——	-	**.84**
613-C*	lb.	——	-	**1.06**
621*	lb.	——	-	**.88**
624*	lb.	——	-	**.75**
633*	lb.	——	-	**.75**
635*	lb.	——	-	**.45**
Modicol N*	lb.	.42½	-	.44½
S*	lb.	.30⅞	-	.32⅞
Nonisol 100	lb.	.38	-	.43
Sodium Silicates 41°/1:3.2	cwt.	1.20	-	2.30
Stabilizer No. 52*	lb.	1.90	-	2.00
89X*	lb.	.75	-	.80
B-5*	lb.	——	-	.70
E6B*	lb.	——	-	.95
G-1*	lb.	1.25	-	1.40
HR*	lb.	.85	-	.89
L*	lb.	——	-	.60
OM-10*	lb.	——	-	1.95
Staflex OY*	lb.	1.00	-	1.20
QXMA*	lb.	——	-	**.70**
Stayrite 10*	lb.	.36	-	.41
P-10*	lb.	.43	-	.45
15*	lb.	.55	-	.57
20*	lb.	.41	-	.46
22*	lb.	1.00	-	1.13
25*	lb.	.35	-	.40
70*	lb.	.70	-	.72
71*	lb.	.90	-	.92
75*	lb.	.61	-	.63
76*	lb.	.53	-	.55
80*; 90*	lb.	.70	-	.72
95*	lb.	.70	-	.72
229*	lb.	.61	-	.63

STABILIZING AGENTS (Cont'd)

Vanstay A* (dms.)	lb.	.50	.53
AB* (dms.)	lb.	.46	.49
AC* (dms.)	lb.	.45	.48
CE* (dms.)	lb.	.44	.47
HT* (dms.)	lb.	.87	.90
HTA* (dms.)	lb.	.97	1.00
HTB* (dms.)	lb.	.70	.73
HTC* (dms.)	lb.	1.09	1.12
HTE* (dms.)	lb.	.80	.83
L* (dms.)	lb.	.32	.35
R* (dms.)	lb.	.67	.70
RR* (dms.)	lb.	.59	.62
RZ-25* (dms.)	lb.	.65	.69
S* (dms.)	lb.	.57	.60
SA* (dms.)	lb.	.81	.84
W* (dms.)	lb.	1.22	1.25
Z* (dms.)	lb.	.62	.65

STIFFENING AGENTS

Polyac*	lb.	—	1.85
Processinfi Stiffener 710*	lb.	.88	.90
Solvitose HDF, H. C-S, T, and E*	lb.	.22	.25
Versatil Gum 8-E*	lb.	.15	.19

SUN CHECKING AGENTS

Allied AA-1144*	lb.	.23	.24
AA-1177*	lb.	.15½	.16½
Antisol*	lb.	—	.23
Antisun* (Chipped)	lb.	.15½	.17½
(Slabbed)	lb.	.15	.17
Heliozone*	lb.	.31	.32
Microflake*	lb.	.20	.24
Nacconol NRSF*	lb.	.40½	.45
NBC*	lb.	—	1.67
Ross Sunproofing Waxes*	lb	—	.15
Sunolite*	lb.	.16	.22
127*	lb.	.16½	.20½
154*	lb.	.23	.25
Sunproof*	lb.	.32	.33
Improved*	lb.	.25	.26
Super*	lb.	.41	.42
Jr.*	lb.	.22	.23
Tonox*	lb.	.54	.56

SURFACE ACTIVE AGENTS

Anhydrapent*	lb.	.56	.59
Anhydrol 6990*	lb.	.51	.56
6991*	lb.	.51	.56
Aquarex D*	lb.	—	.81
G*	lb.	—	.21
MDL*	lb.	—	.33
ME*	lb.	—	.82
NS*	lb.	—	.60
SMO*	lb.	—	.50
WAQ*	lb.	—	.22
Emulphor EL-620*	lb.	—	.40
EL-719*	lb.	—	.58
ON-870*	lb.	—	.55
Hyonics*	lb.	—	.28¾
Igepal CA-630	lb.	—	.29
CO-630; CO-730*	lb.	—	.29
CO-850; CO-880*	lb.	—	.29
Igepon CN-42*	lb.	—	.25
T-33*	lb.	—	.21
T-51*	lb.	—	.13½
T-77*	lb.	—	.49
Kessco 50201*	lb.	—	.44½
50203*	lb.	—	.44¼
18201*	lb.	—	.32
18203*	lb.	—	.35½
Lipal 9-N,* 11-0*	lb.	.28	.29
8-0,* 6-0*	lb.	.29	.30
25C,* 52C*	lb.	.34	.35
15T*	lb.	.23	.24
Nacconol NR (dlvd.)	lb.	.14½	.16
NRSF (dlvd.)	lb.	.40½	.45
Pluronic L62*	lb.	.33½	.39
L64*	lb.	.33½	.39
Sellogen Gel*	lb.	—	.12¾
Soybean Lecithin	lb.	.13	.17
Synatol AV-60*	lb.	.28	.29

TACKIFIERS

Amalgamator Z-4*	lb.	.34	.35
Arceo 620-32B*	lb.	.20½	.21½
716-30*	lb.	.18½	.19½
1041-21*	lb.	.16½	.17½
Arceo A-2*	lb.	.18	.19
Bunaweld Polymer No. 780*	lb.	—	.24
Galex* (dms.)	lb.	.17¼	.20
Indopol H-300*	gal.	1.00	1.22
Koresin*	lb.	1.13	1.15
Liquid Rubber Flux*	lb.	—	.14
Nacconol NRSF* (dlvd.)	lb.	.40½	.45
Nilox Resin* (c.l.)	cwt.	—	16.00
Nopco 2271*	lb.	.16¾	.18¾
OPD*	lb.	.29	.40
PR-162 Resin Emulsion	lb.	.82	—
Resin V	lb.	—	.23½
Synthol*	lb.	.17	.24¾
Vistac A*	lb.	.21½	.22¼
Vistanex LM Grades*	lb.	—	.45
Zirex* (c.l.)	cwt.	—	15.25
82 Resin Solid (dms.)	lb.	.13½	.14½
84 Resin Solid (dms.)	lb.	.13½	.14½

THICKENERS (For Latex)

Alcogum AN-6*	lb.	.06	.06½
AN-10*	lb.	.09	.10
AN-25*	lb.	—	.31
PA-15*	lb.	.13½	.17½
PA-15-B*	lb.	.13½	.17½
Betanol* (dms.)	lb.	.70	.95
CM Starch* (100 lb. bags)	lb.	26.85	—
Gomme Labolene*	lb.	.45	.47
Good-rite K-702*	lb.	.28½	.37
K-704*	lb.	.21	.22
K-705*	lb.	.30	.39
K-707*	lb.	.18	.19
K-708*	lb.	.28	.37
K-710*	lb.	.15	.16
Hycryl A-1000* (t.l.)	lb.	.090	.100
A-2000* (t.l.)	lb.	.335	.360
Hydroseal 3* (50 lb. bags)	lb.	9.19	—
Melojel* (100 lb. bags)	lb.	6.71	—
Modicol VD*	lb.	.13⅜	.15⅞
VE*	lb.	.13⅞	.16⅜
Polyco 296 BT*	lb.	.15	.16
296-N*; 530*	lb.	.15	.16
Propylene Laurate (dms.)	lb.	.57	.82
Sodium Silicate, 41°/1:3.2	cwt.	1.20	2.30
Solvitose Series*	lb.	.22	.25

VULCANIZING AGENTS

Peroxide

Di-cup	lb.	1.10	....
T	lb.	1.10	1.50
R	lb.	1.60	2.00
40C	lb.	.55	.75
UC XK-1960*	lb.	5.50	—

Selenium

Vandex*	lb.	—	7.00
VA-7*	lb.	—	.50

Sulfur

Blackbirdd* (c.l.)	cwt.	—	2.90
Cloud* (c.l.)	cwt.	—	2.85
Crystex*	lb.	.19½	.23
Darex Dispersed Sulfur*	lb.	.14	.16
Devil A* (c.l.)	cwt.	—	2.45
Dispersed Sulfur	lb.	.14	.16
Insoluble Sulfur 60*	lb.	.12½	.13
Ko-Blend IS*	lb.	—	.39
Mist* (Wettable) (c.l.)	cwt.	—	4.05
Spider* (c.l.)	cwt.	—	2.85
Star* (c.l.)	cwt.	—	4.90
Sulfasan R*	lb.	—	1.55
Tire* (c.l.)	cwt.	—	2.45
Tube* (c.l.)	cwt.	—	4.90
Vultac 2*	lb.	.47	.74
3*	lb.	.51	.78

Tellurium

Telloy*	lb.	—	4.00

WETTING AGENTS

Advawet No. 10*	lb.	—	.17
No. 33*	lb.	—	.48
Aerosol 18*	lb.	.37	.42
AY*	lb.	.75	.80
MA 80%*	lb.	.40	.45
OT 75% Aqueous*	lb.	.40	.45
OT 100%*	lb.	.75	.80
OT-B*	lb.	.65	.70

WETTING AGENTS (Cont'd)

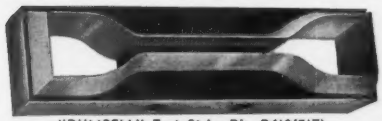
Alrosol* (dms.)	lb.	.36	.40
Alrosperse*	lb.	—	.18
Alrowet D 65*	lb.	.31	.34
Anhydrol 6990* 6991*	lb.	.51	.56
Armacs*	lb.	.28	.77
Arquads*	lb.	.42	.61
Emcol 5100* (dms.)	lb.	—	.31
Energetic W-100	lb.	.28½	.35
Etho-Chemicals*	lb.	.26	.58
Ethomeen S/15*	lb.	.48	.50
T/15*	lb.	.46	.48
Hyonic PE-90*	lb.	.25	.27
PE-100*	lb.	.25	.27
Kessco E-122* (dms.)	lb.	—	.45
18201*	lb.	—	.32
Kreelon 4D* (dms.)	lb.	.13	.16
8G* (dms.)	lb.	.26	.28
Kyro EO* (dms.)	lb.	—	.29¾
Modicol N*	lb.	.42½	.44½
S*	lb.	.30⅜	.32⅞
Nacconol A* (dlvd.)	lb.	—	.52
NRSF* (dlvd.)	lb.	.40½	.45
SL* (dlvd.)	lb.	.084	.10
60S* (dlvd.)	lb.	.19	.225
Nekal WS-25	lb.	—	.38
WS-99	lb.	—	.95
Orvus AB Granules*	lb.	.16¼	.17¾
Parnol*	lb.	—	.13½
Regal Beads	lb.	.12¾	.16¾
H. D. Beads	lb.	.12¾	.15¾
Santomerse No. 3 Paste*	lb.	.26	.30
Sorapon SF-73*	lb.	—	.18
SF-78*	lb.	—	.30
Sorbit P*	lb.	.29	.31
Soybean Lecithin	lb.	.13	.17
Stablex G*	lb.	.50	.90
Tergitol 4* (dms., dlvd.)	lb.	.36½	.37½
7* (dms., dlvd.)	lb.	.43½	.44½
O8* (dms., dlvd.)	lb.	.36½	.37½
P28* (dms., dlvd.)	lb.	.18½	.19
Trenamine W-30	lb.	—	.15
Vultamol*	lb.	—	.17½
Wetsit Conc.*	lb.	.35	.35

MISCELLANEOUS CHEMICALS

Aquesperse 30*	lb.	—	.11
Chiplac Paint	gal.	1.15	5.00
Copper Inhibitor No. 50*	lb.	—	1.20
D-Tac*	lb.	—	.22
Elastopar	lb.	2.05	2.07
2-Ethyl Hexanol	lb.	.23¾	.24¾
Fura-Tone Resin 1226*	lb.	.41	.43
MODX*	lb.	.38	.40
Nacconates*	lb.	.75	4.50
Para Resins*	lb.	.04	.04½
Pigmented Filmite* (dlvd.)	lb.	.16¾	—
Resorcin, Tech.	lb.	.77½	.81½
Rio Resin*	lb.	.70	.72
Rongalite CX*	lb.	—	.21½
Sherosopes*	lb.	.13½	.18¾
Sublac Resin PX-5*	lb.	.23½	.24½
Synpep*	lb.	.54	.60
Tysonite*	lb.	.30	.30½
Vanfre*	gal.	2.45	3.00
No. 3* & No. 4*	gal.	1.95	2.00

HOGGSON TOOLS, MOLDS, DIES

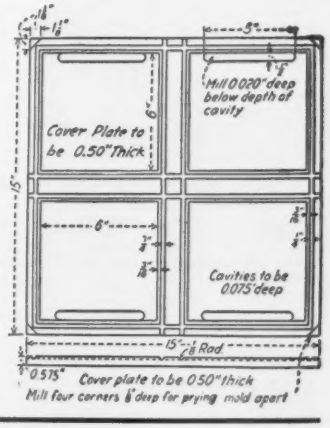
For Rubber Testing and Production



"DUMBELL" Test Strip Die D412(5IT)

For making tensile test samples, we make many types of slab molds. One is detailed at the right. These are plain or chrome finished. We usually stock molds for making adhesion, abrasion, flexing, compression and rebound test samples, but supply special molds promptly. We also furnish hand-forged tensile dies for cutting regular or tear test samples.

SLAB MOLD D15-55



HOGGSON & PETTIS MFG. CO., 141A Brewery St., New Haven 7, Conn.

Pac. Coast: H. M. Royal, Inc., Downey, Calif.

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Replies to keyed advertisements will be forwarded via ordinary mail to advertiser without charge.

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Copy for July 1960, issue must be received by Friday, June 24

POSITIONS WANTED

PLANT MANAGER. Must relocate. 22 years solid background in all phases of administration and manufacturing. Diversified and wide product lines. Successful proven record as administrator and in labor relations. Wish to associate with progressive and growing company. Address Box R-522-P, RUBBER AGE.

PRODUCT MANAGER, EXECUTIVE SALES. Silicone rubber specialist 12 years in management, sales engineering, product development, cost estimating, cost reduction. Compounding and expert bonding knowledge. Familiar with most other elastomers. Chemical and metallurgical education and background. Recently involved with many missle applications. Experience in flexible and rigid waveguide plumbing manufacture. Excellent nation-wide customer relations with aircraft and missles industry. Want challenging opportunity, travel. Prefer West Coast location. Address Box R-535-P, RUBBER AGE.

LATEX CHEMIST—19 years experience. Laboratory experience in latex adhesives, dipped goods, coagulant compounding, foam products. All latices Development work and plant trouble-shooting. Some dry rubber and plastisol experience. Resident northern New Jersey. Address Box R-541-P, RUBBER AGE.

CHIEF CHEMIST, over 15 years unusually varied achievement, mostly precision molded unique military and industrial, all polymers. Sales, production conscious. Address Box R-543-P, RUBBER AGE.

EXPERIENCED PLANT MANAGER. Graduate engineer, age 41, with solid experience supervising production, labor relations, and engineering activities involving mills, Banburys, calenders, extruders, refiners, coaters, etc. Directed over 500 hourly, supervisory and technical personnel. Ten years experience negotiating labor contracts. Capable of accomplishing important business objectives—have had the sole responsibility for locating, erecting and starting up two complete rubber plants in past five years. Prefer North East or West Coast location. Address Box R-545-P, RUBBER AGE.

TECHNOLOGIST with management concept desires responsibility with progressive organization. Sixteen years diversified experience in rubber mechanical goods as development engineer and chief chemist. BCHE, M.S. Mgmt. Engrg., age 36. Presently employed. Address Box R-548-P, RUBBER AGE.

RUBBER TECHNOLOGIST desires change. Presently employed. Twelve years experience in rubber and silicone development, processing, production and quality control of compounds for wire, cable and molded goods. Address Box R-549-P, RUBBER AGE.

PLANT MANAGER. Production—twenty-five years heavy factory experience in production of latex dipped products. Aggressive and have record for delivering top results. Also experimental and development work background. Seeks connection with progressive and medium sized company. Address Box R-553-P, RUBBER AGE.

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RAPIDLY GROWING AAA1 RUBBER COMPANY, established over 100 years. New management. Have immediate need for chemists and production men for branch plants and main factory operations. Locations: Midwest, Southwest and West Coast. Excellent promotional possibilities. Experience in rubber or elastomers essential, including educational background of organic chemistry or chemical engineering. Address Box R-521-W, RUBBER AGE.

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Two openings in Borger, Texas, group. One requires 5-10 years compounding experience in tires, tubes and camelback. Other requires 5-10 years compounding experience in sole, heel and mechanical rubber goods. Benefits include contributory retirement, insurance, hospitalization. Send resume and salary requirements to: J. M. HUBER CORPORATION, P. O. Box 831, Borger, Texas.

ESTABLISHED MANUFACTURERS REPRESENTATIVES

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HELP WANTED—Continued

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John Schimmel III, Manager
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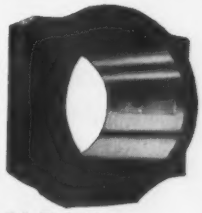

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Corrosion, weathering and sunlight tests. Four locations in Southern Florida for inland, salt atmospheric, tidewater and total immersion exposure tests.
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One Farrel-Birmingham 22 x 60 mill with drive and 125 h.p. motor. Controls with dynamic braking. Address Box R-542-S, RUBBER AGE.

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Machinery and inventory to manufacture vinyl and rubber pipewrap tape for corrosion control. Volume potential runs in excess of one million dollars per year.

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MILLS 40" to 60" (new drives).
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All rubber machinery will go and fast at the prices we have set.

This is heavy duty equipment geared to today's severe production requirements not ordinarily found available on the used machinery market. This is equipment you buy, not sell.

As the exclusive dealer on this sale, we will be pleased to supply you with all details and prices of the following any items.

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1—20″ x 24″ x 36″ Refiner
1—20″ x 24″ x 36″ Cracker
} Heavy duty equipment—One line with 300 HP motor & encl. Herr. reducer arranged with blower and overhead sifter for continuous scrap rubber refining.

1—18″ x 18″ x 50″ Mill—With 75 HP motor and Herr. reducer
2—22″ x 20″ x 60″ Mills
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1—20″ x 22″ x 60″ Mill—With 100 HP motor & Herr. drive
1— 8″ x 16″ Lab Mill—With 15 HP motor and drive
1— 6″ x 12″ Lab Mill—With 7½ HP motor and drive

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1—6″ Farrel-Birmingham-Roller Feed
1—6″ Farrel-Birmingham
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Single and Double Slab Cooling Units Complete with Pumps and Motors.
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#95)

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S-1120 Monoblock Back Wash Pump with 5 HP Motor.
S-1121 Pamona Turbine Pump with 60 HP Motor.
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1142) Allis Chalmers Centrifugal Pump with 25 HP Motor.
S-1144 Gould Pump, 250 PSI, with 75 HP Motor.
S-1146 Gould Centrifugal Pump with 25 HP Motor.
S-1148 Bean Pump with 20 HP Motor.
S-1150 Milton Roy Chemical Pump (Laboratory), ⅛ HP Motor.

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3—Stewart Bolling 30″ x 30″, 21″ dia. ram, 28″ daylight.
1—Stewart Bolling 18″ x 18″, 10″ dia. ram.
1—Stewart Bolling 24″ x 24″, 14″ dia. ram.
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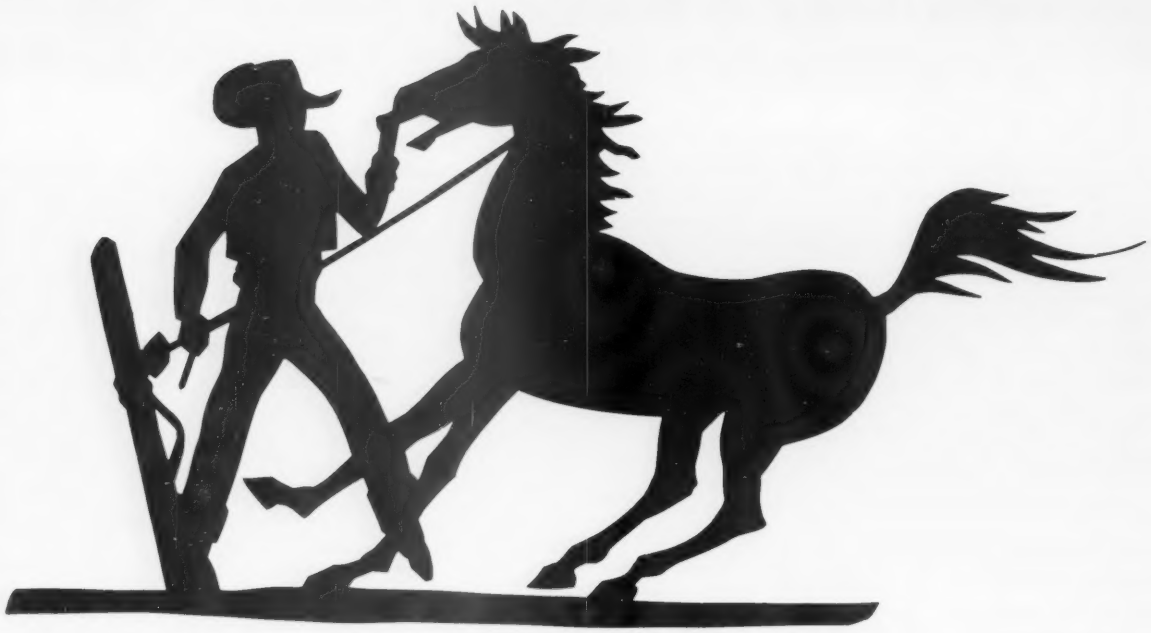

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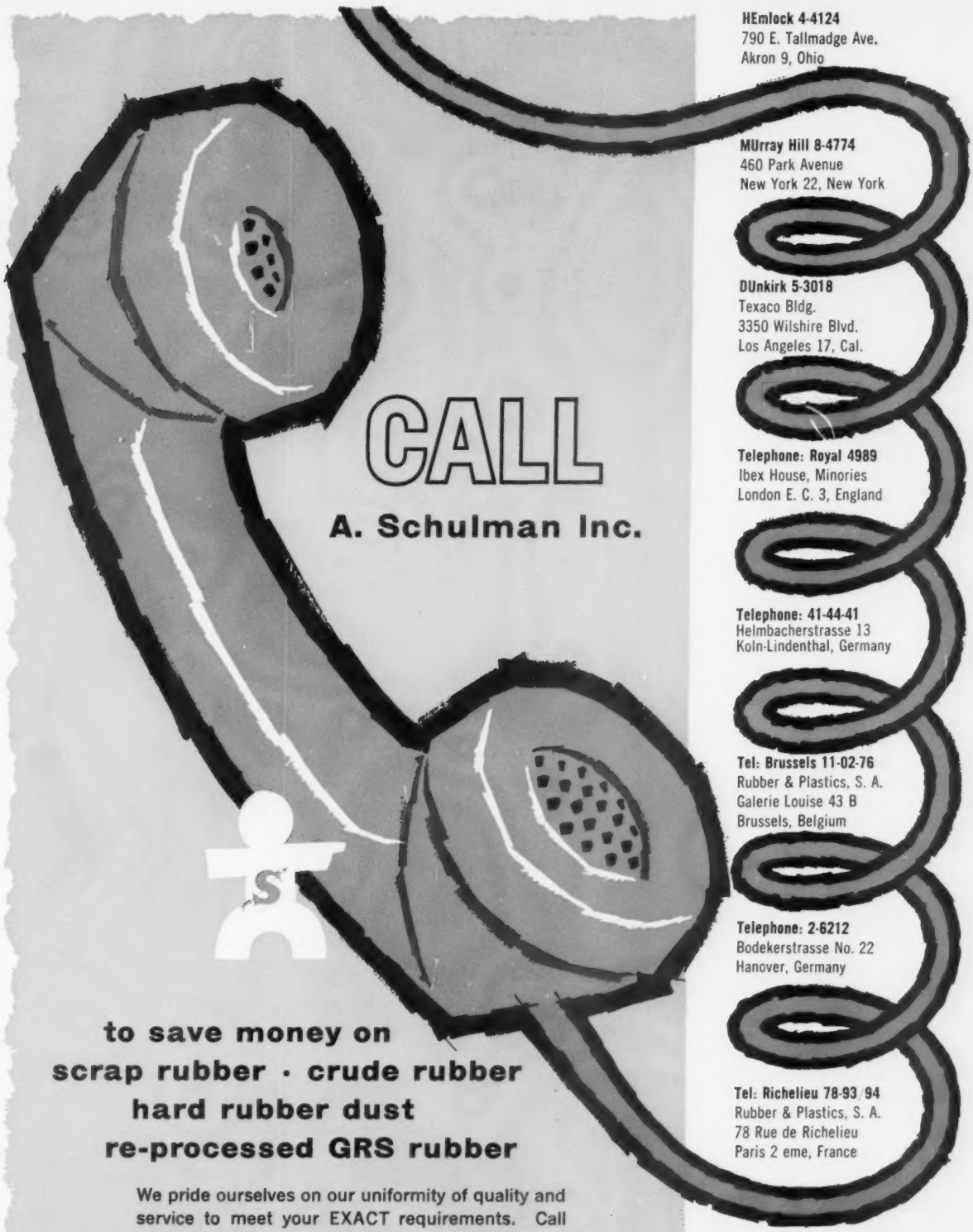

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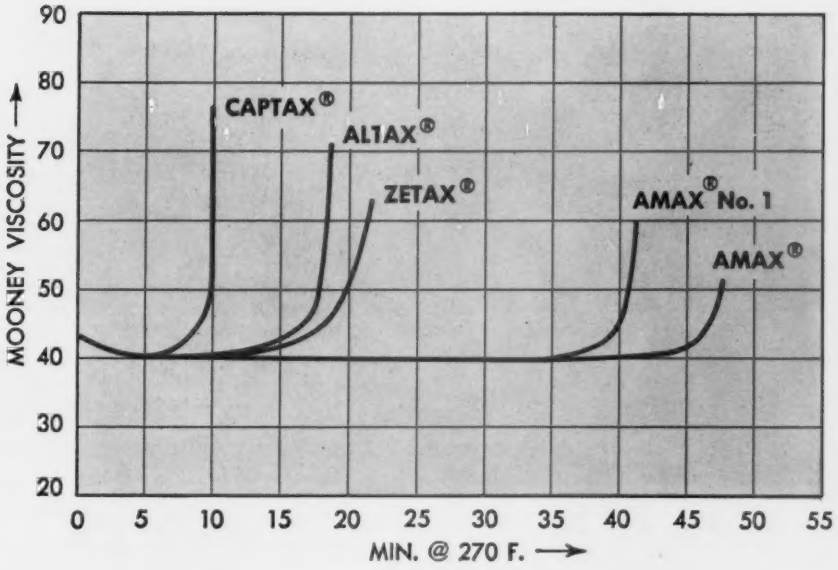

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